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Entangled stakeholder roles and perceptions in health information systems: a longitudinal study of the UK NHS N3 network

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ABSTRACT

The combination of pervasive and complex technology and an increasingly challenging healthcare environment is the setting for this research study. As a longitudinal case study, the research tracks the development and implementation of a large private information systems network in the UK National Health Service (NHS). Using stakeholder theory, we unpack the story of a complex network of stakeholder roles and perceptions and how these change over time. Our findings show that favorable and unfavorable positions held by multiple stakeholder groups become entangled, where even the same focal group may adopt competing positions which undermine the adoption of the health network. As this situation develops, the policy and implementation of the broader health IT program becomes confused and destabilized. This study makes three contributions. It expands the literature on stakeholder theory within the IS domain; it extends the managerial focus of stakeholder approaches to include policy-making in the diverse multi-stakeholder setting of healthcare; it demonstrates how stakeholder analysis can be employed in IS research by adopting a broader, dynamic approach to identifying and including different stakeholder groups focusing on their varied roles and views during the course of a large scale health IT program.

KEYWORDS

Entangled information systems, interpretive stakeholder analysis, healthcare, NHS, N3 infrastructure

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1. INTRODUCTION

The UK health sector comprises a federated structure where many different organizations (general practices, hospitals, out-patient departments, clinics, laboratories, surgeries, specialist units) all use information technologies for clinical and non-clinical purposes. Integrating diverse technologies for patient-data sharing, at the inter-organizational level, is a contentious and challenging issue for policy-makers, healthcare professionals and other relevant stakeholders (Payton, Pare, LeRouge and Reddy, 2011). At the intra-organizational level, the functional and specialist structure of organizations (i.e., teaching hospitals) builds on this complexity, as stakeholders compete for scarce financial resources for healthcare technologies (i.e., medical devices, monitoring equipment, IT applications) across and within departments (Wang and Huang, 2012).

This research is a longitudinal case study which tracks the development and implementation of a national IT infrastructure in the UK Health sector. The development of a common infrastructure 'for secure sharing of information' was an integral part of the launch of the National Health Service (NHS) Information Management and Technology (IM&T) strategy in the early 1990s (NHS Executive, 1994). Part of the IM&T strategy was the NHS-Wide Networking (NWN) project, aiming at efficient, secure and cost-effective communication across the NHS, and leading to the development of the *NHSnet* network in the mid 1990s. As the NHS strategy and structure were revised at the turn of the century, the NHSnet was superseded by the NHS *N3* network infrastructure. This formed part of the National Program for Information Technology (NPfIT) to connect over 30,000 General Practitioners (GPs) in England to almost 300 hospitals, potentially allowing online access to personal health and care information of 50 million English citizens (patients). Commencing in 2002, the NPfIT became the largest public health IT program ("the Program") world-wide (Chantler, Clarke and Granger, 2006). The NHS N3 comprised the 'backbone' of the Program, with other large-scale projects in the form of an Electronic Health Record (EHR), Electronic Prescription Service (EPS) and Picture Archiving and Communications System (PACs) being developed concurrently (NHS Connecting for Health, 2006).

Since the IM&T strategy, and then the NPfIT, involved numerous stakeholders including, politicians, clinicians, patients, hospital managers and administrators, patient groups, healthcare charities, health IT firms and others, this study adopts an *interpretive stakeholder*

analysis to capture the diversity and complexity of the task ahead: the introduction of a national information infrastructure in the NHS. Using stakeholder theory, we develop a conceptual model to analyze data collected over fifteen years. Our findings suggest an evolving and entangled health information systems environment, where values, interests and responsibilities among the various stakeholders serve to either enhance or challenge the NHS network infrastructure. As both an inter- and intra- organizational system, the NHSnet and then the N3 is part of a wider political, economic and social debate, with different stakeholders expressing either their support or lack thereof to the infrastructure. The network is further challenged, not simply as a technical initiative, but as part of a large-scale public sector IT outsourcing contract that is 'too big to fail' (Ritter, 2010) yet whose benefits 'are yet to be delivered' (British Parliament, 2013). As the NHSnet transitions to become the NHS N3, our study contributes to the information systems literature on long-term, large publicly funded IT projects, building on stakeholder theories which capture the diversity of the health sector, in addition to offering policy-makers and practitioners guidelines for introducing complex health IT.

This paper is structured as follows. First, we discuss how stakeholder theory has evolved in the management literature, where it originates, and second, we review its use in the IS field. Stakeholder theory has become very popular within social science and has been adopted in the general management literature by corporate strategy and business ethics scholars (Freeman, 1984; Arnold et al, 2012). As an inherently managerial and pragmatic theory (Donaldson and Preston, 1995) it provides a useful lens for analyzing the complex relationships between organizations, groups and individuals. While it is relevant for analyzing large-scale, complex IT programs, such as the NHSnet and the N3, we suggest that its theoretical base needs further development. We believe this is achieved by positioning different stakeholders within their institutional, organizational, temporal and spatial contexts.

In order to illustrate how stakeholder theory has shaped our conceptual framework, we present a set of theoretically grounded *principles* for the study of stakeholders. We then present our methodology. The challenge of capturing the views and perceptions of multiple stakeholders in large IT projects in healthcare supports an interpretive stakeholder analysis and we show how the principles guided our approach. Our primary data is supplemented with secondary source data from government reports, audits and media coverage of the NHS IT programs and the NHS network infrastructure. The presentation of our case data on the NHS network infrastructure follows. We examine how it has developed over time as a result of new policy directives and many contractual changes. We employ a heuristic representation which captures the entanglement and perceptions of multiple stakeholders

vis-à-vis the NHSnet and the N3, identifying five ideal type representations of stakeholders, which are used as a point of reference for reviewing stakeholder 'movement' over time. We conclude with a discussion on our theoretical and methodological contributions and with suggestions for IS research using stakeholder analysis.

2. STAKEHOLDER THEORY

The body of literature using the term *stakeholder* has grown considerably over past decades. The origins of stakeholder theory are found in strategic management (Clarkson, 1995; Freeman, 1984; Frooman, 1999) and more generally in organization theory (Donaldson and Preston, 1995; Rowley, 1997). A commonly used definition is, *'A stakeholder in an organization is (by definition) any group or individual who can affect or is affected by the achievement of the organization's objectives'* (Freeman, 1984, 46). Despite the wide citation of this reference, a variety of stakeholder definitions are in place (see for example the list provided by Mitchell et al., 1997, p.858) as well as a variety of terms on how organizations can identify, analyze or manage their stakeholders (stakeholder theory, stakeholder analysis, stakeholder mapping, stakeholder engagement and stakeholder identification).

An analysis of the extant literature on stakeholder theory identifies three major periods (Laplume et al, 2008). The first is described as incubation (1984-1991); the second, incremental growth (1991-1998); and the third, maturity (1999 to the present). Initially, stakeholder theory was mainly discussed in conference proceedings, workshops and practitioner journals. As it became more established, the publication of seminal works began to appear in leading academic journals, such as the Academy of Management Review (e.g., Donaldson and Preston, 1995; Jones, 1995; Mitchell et al., 1997). Building on this work, the management literature presents since the late 1990s a notable shift from the instrumental agenda on improving an organization's strategic position to a normative rhetoric that acknowledges the value of the stakeholder concept for ethical management (Arnold et al, 2012; Freeman et al., 2010; Taschman and Raelin, 2013). In the same period, the stakeholder literature has expanded its theoretical repertoire in many areas including, corporate strategy (e.g., Berman et al., 1999; Harrison and Wicks, 2013; Hillman et al., 2001; Frooman, 1999), business ethics (e.g., Garriga & Mele, 2004; O'Riordan and Fairbrass, 2014; Phillips, 2003) and policy (e.g., Balzarova and Castka, 2012; Lahdelma et al., 2000; Rasche, 2012).

Common across this research is the view that stakeholder theory is 'managerial', where attitudes, structures, and practices all constitute a stakeholder management philosophy

(Donaldson and Preston, 1995:87), and represent a pragmatist approach to management theory (Wicks and Freeman, 1998). For some, the paradoxical nature of stakeholder theory (Laplume et al, 2008) treats stakeholders as both means to ends and ends in themselves (Goodpaster, 1991). A more nuanced approach to stakeholder theory recognizes existing and potential conflicts among stakeholder interests, where stakeholders may exploit the political process to appropriate value for themselves and control the value created for others (Freeman, Wicks, Parmar, 2004). In this vein, Mitchell, Agle and Wood (1997) contribute a theory of stakeholder identification and salience where stakeholders possess one or more of three relationship attributes: power, legitimacy, and urgency. They suggest that stakeholders are identified by their possession or 'attributed possession' of characteristics including, stakeholder power to influence the firm; the legitimacy of the stakeholder's relationship with the firm, and the urgency of the stakeholder's claim on the firm. Notwithstanding the magnitude and salience of the 'stake', a stakeholder is seen as part of the nexus of implicit and explicit contracts within the firm. Managers are given special attention here as they occupy a position within the heart of the nexus of contracts (Hill and Jones, 1992, 134). Stakeholder theory is described as a 'popular heuristic' for researching the management environment, despite not having attained 'full theoretical status' (Mitchell, Agle and Wood, 1997).

A consequence of the dominant managerial focus of stakeholder theory in this literature is that stakeholders are studied in relation to a focal organization. Such an approach, however, overlooks the complexity of inter-organizational relations in the wider socio-political and economic context. The longitudinal study presented in this paper captures the complexity around the interpretation and implementation of public sector health IT policy – the UK NHSnet/N3 – within a federated NHS organization which employs over 1.3 million people. Notwithstanding the managerial and pragmatic theme of much of the stakeholder literature in business and organizational studies, we demonstrate the potential theoretical relevance and application of stakeholder theory for information systems research.

3. INFORMATION SYSTEMS STAKEHOLDERS

The growing use of the term stakeholder in information systems research supports the view that multiple stakeholders play a part, albeit at varying degrees of power, control and influence, in the information systems mix of activities. Within information systems, there is a general trend towards acknowledging the roles and perceptions played by a broad and heterogeneous set of interested parties or relevant social groups (Wilson and Howcroft, 2005). As the stakeholder concept prompts the recognition of multiple interests, stakeholder

analysis encourages a broader approach to information systems development, implementation and strategic planning (Bento, 1996, Lyytinen, 1988, Pan, 2005, Ruohonen, 1991, Vidgen, 1997).

Who are information systems stakeholders? We define information systems stakeholders as the individuals, groups, organizations or institutions who can affect or be affected by an information system, adapting the stakeholder definition in the seminal work of Freeman (1984). This broad definition extends the scope of much earlier work within information systems research. While stakeholders of information systems have been located or studied, in the past, internally within the boundaries of a single department or organization, they are also likely to be influenced by multiple constituencies across external entities comprising complex socio-political and economic relationships not easily depicted in a simple list (Pouloudi and Whitley, 1997). Despite the (ongoing) predominant focus in the literature on the users, developers and managers, information systems stakeholders include other groups and individuals (Lyytinen and Hirschheim, 1987), such as, policy-makers, activists, government agencies, professional and membership organizations among others. This extends the stakeholder definition beyond the managerial remit. For example, a government policy-maker may not be a direct user of an information system, but will have a 'stake' in decision-making on matters such as, for example, resource allocation and policy implementation. Similarly, a clinician may adopt an advocacy role to promote a health IT program to increase adoption rates, while other clinicians may resist such change (Currie, 2012). Individual 'stakes' may thus vary even though people may occupy the same professional or managerial role.

A further observation of the information systems literature is the limited or casual reference to the process of stakeholder identification (Pouloudi and Whitley, 1997). Few researchers address this limitation, explaining explicitly why certain parties are stakeholders and how they are identified in the particular empirical context of the respective study (Howard et al., 2003; McAuley et al., 2002; Shankar et al., 2002). In the context of healthcare IS research, the literature using stakeholder analysis is relatively scarce, despite the many stakeholder groups involved in introducing information systems into this complex and diverse sector. A notable exception is the extensive list of health IT stakeholders provided by Payton et al. (2011). An earlier study by Mantzana et al. (2007) proposes a method for identifying the role of actors in IS adoption which are both static and dynamic, leading to a set of 18 actors. While this work elucidates the IS adoption process in a particular healthcare setting, and more particularly, the key actors (or stakeholders) involved, the authors stress the data and observations from the case cannot be generalized. A methodological challenge, however, is

that stakeholder identification is a complex process, particularly in the case of large-scale and long term information systems programs, therefore inviting research that presents extensive and systematic illustrations of the relevant methodology, which can serve as a reference for similar work.

Other work on stakeholder groups, including hospitals (Palvia et al., 2012) and patients (Paul et al., 2012) observes the varying degrees of power and interest among stakeholders (Boonstra, Boddy and Bell, 2008) and different levels of stakeholder engagement in large public sector health IT projects (Rotomskiene, 2011; Cavazza and Jommi, 2012). Few studies, however, have traced stakeholder engagement and involvement over long term health IT projects, particularly where shifts in policy-making stem from direct or indirect stakeholder actions and priorities. Within the health IT literature, the concept of 'stakeholder' is used widely. However, our review found the term is largely used in a mechanical sense, with a view to developing managerialist tools and techniques to 'engage' stakeholders in various health program initiatives (Cresswell and Azis, 2009). Moreover, the UK NHS public documents contain numerous policy statements from healthcare organizations outlining their *'stakeholder engagement strategy'* with guidelines for identifying key stakeholders, assigning roles and responsibilities and program evaluation methods and techniques. We note from this literature that stakeholders are invariably described as either engaged, or committed to a health IT program or otherwise, not fully engaged, or even resistant (Pagliari, 2005). This extends to government publications where the failure to 'engage' key stakeholders in the NPfIT Program was depicted as a policy shortcoming which underplayed the importance of 'winning the hearts and minds' of NHS staff (NAO, 2006, 2008). The academic and practitioner literature on stakeholder engagement in relation to large-scale, complex health IT projects seems therefore largely unconcerned to address the deeper issues underpinning how and why identified stakeholders may become fully engaged or dis-engaged with such Programs. Further, there is little emphasis on how clinical and non-clinical groups, for example, may shift their positions over time from being generally supportive of technical change to becoming resistant to change. While these issues may be discussed at a superficial level, the 'solutions' put forward to increase stakeholder engagement are usually to generate more information about the policy rationale for a new health IT program, rather than a deeper analysis about how such change will impact on different stakeholder groups.

In order to understand IS stakeholders in more depth the next section proposes a set of literature-based principles that characterize stakeholders, their roles, interests, perceptions, behavior and relations. These principles serve as the basis for our interpretive stakeholder

analysis approach which is then discussed extensively in the methodology section further on in the paper.

Principles underlying the stakeholder concept

Given the diversity of stakeholder theory, coupled with the rather loose set of concepts, it is important to pursue a more systematic and comprehensive use of the stakeholder concept in our theoretical and empirical work. Reviewing the vast literature on stakeholder theory, we group this work under a more coherent list of stakeholder characteristics, articulated as a set of principles (Table 1). The principles underlie stakeholder definition (who counts as a stakeholder), stakeholder roles, interests, perceptions and behavior, as well as stakeholder relations, and can be used as theoretical anchor points for stakeholder identification and analysis.

The first principle ('*the set and number of stakeholders are context and time dependent*') acknowledges the importance of context. Context is used here in a broad sense; primarily, it is the context and timeline of the research that marks the salience of stakeholders (in our case, those who influence or are influenced by the NHSnet/N3). Within the research timeline, especially in a longitudinal research project, the set of stakeholders change, as new players enter or leave the research scene. Additionally, the stakeholders identified bring on board their own views on who counts as a stakeholder. In this sense, pre-defined lists of stakeholders in extant research cannot be treated as a stable set and can only serve as a starting point for stakeholder identification in any new empirical setting. The second principle ('*stakeholders may have multiple roles*') is particularly relevant for information systems research, where we consider stakeholder roles vis-à-vis the information system investigated (e.g., users, developers, resistors and so on), whereas stakeholders also have one or more professional and social identities that are relevant for the research context (e.g., as defined by their expertise, hierarchical position in an organization, membership of a professional association). The third principle ('*different stakeholders may have different values and perspectives*') is at the heart of stakeholder analysis: we study stakeholders precisely because they carry different stakes and have different views, as these can help us appreciate complex phenomena. The fourth principle ('*stakeholder roles, perspectives and alliances may change over time*') refers to the fluidity of any research context – as conditions change (e.g., because a new information system is implemented) new roles and perspectives emerge in response to such change. Stakeholder relations and alliances change in tandem. The fifth principle ('*Stakeholders relations and power matter in the shifts in their roles, perceptions and alliances*') marks the interdependence of stakeholders, stakes, relations and the phenomenon under study. As these evolve, some stakeholders are in a

more powerful position to serve their stake, due to their formal role, the alliances they have formed, or the shape of the debate (powerful actors may shift relations across the stakeholder network, and 'translate' key issues in line with their interests – cf. Latour, 1987).

All five principles are grounded on the extant stakeholder literature, although the respective support is scattered across different texts and disciplinary fields within social science, as becomes evident in the selected bibliographical support for each principle that is presented in Table 1.

Table 1 Stakeholder Principles

Principles	Indicative supporting evidence in the management and IS literature
1. The set and number of stakeholders are context and time dependent	"Within each perspective [of an IS] we may distinguish different groupings of IS stakeholders […] The 'level of aggregation' may vary from one situation to another: from distinguishing between individuals (one actor as a stakeholder), and groups (multiple actors as a stakeholder), to larger collectivities such as a company or a society" (Lyytinen and Hirschheim 1987, pp. 262-3); "actors come and go" (Mitroff and Linstone 1993); "Stakeholders depend on the specific context and time frame" (Pouloudi and Whitley, 1997, p.5); "stakeholders change in salience" (Mitchell et al. 1997, p. 879).
2. Stakeholders may have multiple roles	Stakeholders "wear multiple hats" (Gilbert et al. 1988 p. 111); "individuals can belong to multiple stakeholder groups" (Rowley and Moldoveanu 2003, p. 212).
3. Different stakeholders (even within the same 'stakeholder group') may have different values and perspectives – these may be explicit, implicit or hidden	Resistance to change, counter-implementation measures and workarounds can be better understood by shedding light on organizational and political issues (e.g., Azad & King, 2012; Keen 1981; Lapointe and Rivard 2005; Markus 1983); "the presence of multiple stake–holders with different perspectives means that the definition of use quality (the 'ends') is just as problematical as the management of quality (the 'means')." (Vidgen et al. 1993, p . 110); Managerial hidden agendas constrain user participation and involvement in information systems development (Myers and Young 1997); "Stakeholders may have a supportive influence versus conflictive influence" (Coakes & Elliman, 1999, p.10); "we know that developers and users are both important stakeholders in the design and development of information systems and that they often bring a different perspective to IT projects" (Keil et al. 2002); "stakeholders [are not] naively saturated by the discourse of a dominant mode of thinking to the point at which they cease to see the impact on their own lives" (McAuley et al. 2002, p. 253); "there are many stakeholder groups with divergent goals that are affected by e-government initiatives" (Fedorowitz et al., 2010, p.317).
4. Stakeholder roles, perspectives and alliances may change over time	The literature on technological frames (Lin and Silva 2005; Orlikowski and Gash 1994) recognizes different stakeholder perspectives by making it a point to explore where and why key stakeholders' frames are incongruent so as to avoid difficulties in information systems implementations: "frames are likely to be both time– and context–dependent, and are always more valid when examine in situ rather than assumed ahead of time" (Orlikowski and Gash 1994). "The position of each stakeholder may change over time" (Pouloudi & Whitley, 1997, p.6) In the e-business literature, the discussion of cybermediation and re–intermediation (Giaglis et al. 2002) eloquently shows changes in stakeholder roles over time Promoters of an information system may use resources to mobilize and engage previously inactive stakeholders (Boonstra et al., 2008).

5. Stakeholders relations and power matter in the shifts in their roles, perceptions and alliances	The notion of expectation failure in information systems (Lyytinen and Hirschheim, 1987) reflects exactly this idea of a situation (or a system) being unsatisfactory for some stakeholders (even though others may consider it a success): "Feasible options may differ from the stakeholders' wishes" (Pouloudi & Whitley, 1997, p.6) "stakeholder theory needs to be able to place firms in their proper context – that of multiactor relationships" (Frooman 1999) "Stakeholders may have actual versus legitimate influence" (Coakes & Elliman, 1999, p.10). Stakeholders may also act 'against their interest' if that contradicts a fundamental value or belief (Introna and Pouloudi 1999). "how a particular stakeholder group relates to the focal organization – whether and how a stakeholder attempts to influence the focal firm – depends on the surrounding context of relationships" (Rowley and Moldoveanu 2003, p. 212); "interest overlap (or divergence) across stakeholder groups affects stakeholder actions" (ibid., p. 213; cf. Rowley, 1997) Stakeholders may exploit the political process to appropriate value for themselves and control the value created for others (Freeman et al., 2004) Boonstra et al. (2008) show how powerful players may resist IS implementation, so that promoters of the project are unable to introduce a change; some stakeholders may even be unable to voice their expectations (Lyytinen and Hirschheim 1987). "Stakeholders as influential actors possess power over the corporation and define the limits of responsibility" (Onkila, 2011).

We do not claim that the five principles constitute a definitive and exhaustive list, although they serve as a theoretically-grounded canvas that epitomizes our understanding of stakeholders, their roles, interests, values and interrelations, particularly as these may take shape in the context of complex IS projects. In this regard, the principles may be used for abstraction and generalization (Klein and Myers, 1999). They constitute a powerful guide for the systematic and dynamic identification and analysis of stakeholders in specific contexts, since it is important to identify various stakeholders based on generic principles and specific attributes (Michell et al 1997, p.871); that is, to have a theoretical basis that does not exclusively fit the specific characteristics of a single empirical context. The next section shows how these principles were operationalized in our research, presents our methodology in detail, and provides further context for our empirical work.

4. METHODOLOGY: INTERPRETIVE STAKEHOLDER ANALYSIS

Interpretive epistemology and stakeholder analysis both emphasize the need to study and be responsive to different perspectives. On the one hand, the focus on stakeholders prompts the researcher to recognize that there are different perspectives, different stakeholders and different interests ('stakes') (Freeman et al, 2004). The analysis of these interests can lead to interesting research results (e.g., a more nuanced understanding of the situation, a

politically sensitized approach to information systems implementation). These results differ depending on who employs stakeholder analysis, in what context and with what expectations and rationale for its use (Rowley, 1997). It would thus seem reasonable that stakeholder analysis is a research approach that fits well within the interpretive research paradigm[1].

On the other hand, interpretive research, as a consequence of its non–positivist epistemology, calls for attention to the different ways of understanding the research context. Indeed, we can find evidence for the need to consider different stakeholders' perspectives in most interpretive rhetoric—even if the term stakeholder is not explicitly used (Chua 1986; Orlikowski and Baroudi 1991; Walsham 1995; Rivard, Lapointe, Kappos, 2011). Klein and Myers (1999), in their 'principle of multiple interpretations' argue this point, prompting researchers to be sensitive to possible differences in interpretations among research participants. Yet there is little evidence of information systems interpretive research *explicitly* addressing stakeholder issues *as part of the adopted methodology*. Rather, the information systems literature only discusses stakeholder issues as they arise from interpretive work. In other words, because complex relations characterize the research context, stakeholder issues *emerge* as important, but have not been used explicitly to guide the research approach (e.g. Walsham 1993). Thus, most interpretive research provides an opportunity to identify stakeholders and highlights issues that are important to various stakeholders, but does not guide the researcher in how to identify the stakeholders and how the stakes they hold may persist or change over time. This lack of guidance has led us to reflect on our approach and, based on the stakeholder principles presented in the previous section, to document our methodological *Interpretive Stakeholder Analysis* approach. This entails a *dynamic* and *iterative* approach to stakeholder identification and analysis and is presented in detail in Table 2. The table explicates how the theory-informed stakeholder principles presented in the previous section (first column) carry specific methodological implications within the interpretive research paradigm (second column) and explains how these guided and shaped, in turn, our research agenda and analysis (third column).

Interpretive stakeholder analysis has helped us identify and analyze stakeholders in the NHSnet/N3, using the data collection methods discussed below. We recognize the methodological challenge of this approach, since interpretive methods and techniques used in interviewing capture the views and perceptions of multiple groups and individuals within

[1] Interestingly, most stakeholder research does not make the underlying philosophical assumptions of the approach adopted explicit. Burgoyne argues that stakeholder analysis is not tied to specific ontological and epistemological assumptions (Burgoyne 1994). He argues that this "'middle–range' status of stakeholder analysis is one of its advantages and attractions, as well as perhaps being one of its sources of frustration" (p.88). Certainly this is consistent with the multiple ways in which the stakeholder concept has been employed in information systems research (Flak and Rose 2005; Pouloudi 1999).

the domain of healthcare, broadly defined. However, through constructing a more rigorous set of guidelines for our empirical study, we aim to collect rich primary and secondary data, which identifies multiple stakeholders with entangled interrelations and intertwined agendas. Having detailed our research approach and shown how it was driven by stakeholder theory, we believe can prove a useful reference point for other interpretive researchers exploring stakeholder perspectives of an IS phenomenon.

We also acknowledge that our own interests (in our roles as researchers, journal editorial board members, citizens and potential patients) also influence our data collection and interpretations; we are stakeholders of the NHS N3 as well. As interpretive researchers, we consider this to be a strength, as it ensured our continued motivation to pursue the implementation of the network and the related strategy programs over the years. Our longitudinal engagement has also helped us recognize how debates on similar topics recurred over the years, while the landscape of active stakeholders changed. The strength of the longitudinal interpretive stakeholder analysis is that we had the opportunity to delve into the 'what' and 'how' in depth, taking into account multiple perspectives. Our research enquiry was also strengthened by the rich secondary source material which was regularly published by the NHS, other government agencies, the media and professional organizations, such as those that represent both medical and computer fields. This material provided excellent factual data as well as journalistic accounts of the NPfIT, which supported our empirical data, as discussed in detail in the next sections.

Table 2. A theory-informed Interpretive Stakeholder Identification and Analysis research approach

Stakeholder Principles	Methodological Implications for Interpretive Stakeholder Identification and Analysis	How these are reflected in the research agenda for this study
1. The set and number of stakeholders are context and time dependent	Use relevant literature to identify stakeholder groups to target *initially*	Literature on IS, management, healthcare, policy were used as anchor points to identify initial stakeholder groups (i.e., we noted the stakeholder groups identified by relevant papers in our literature review and considered their pertinence in our empirical context).
	Identify additional stakeholders as empirical material is collected	We deliberately invited interviewees to identify those they considered to be relevant stakeholder groups for our research (cf. Principle 5).
	Adopt a longitudinal approach	We pursued our research agenda over 15 years. During this research, certain topics came to the foreground and then faded out over time. As this happened, we noted how the 'protagonists' changed, with some stakeholder groups coming to the foreground and others becoming less visible. We also invited stakeholders to talk about history and the future, and used these responses to follow the changes in stakeholder salience.
	Review and update the set of relevant stakeholders as the research unfolds, new stakeholders appear (e.g., because of organizational restructuring) or new research in the area gets published	Following from above, we noted the entry of new stakeholders. These were occasionally formally 'created' by other stakeholders (e.g., committees were formed). Stakeholders also 'entered the scene' (e.g., were acknowledged as stakeholders by other stakeholders) as a certain topic of interest gained momentum, or because they wished to raise awareness about an issue pertinent to a change, such as a new information infrastructure or policy. Conversely, we also noted that stakeholders disappeared when structural changes took place (e.g., at national level, bodies dissolved following NHS restructuring) or 'exited the scene' when an issue was resolved or interest faded.
2. Stakeholders may have multiple roles	Consider stakeholder membership in different (professional, social) groups – Note that membership in different groups may *per se* entail a conflict in vested interests	One obvious 'dual' identity for many of the stakeholders in this research is their professional role (e.g., doctor) vs. their role with respect to the NHSnet/N3 (e.g., user). Additional roles and identities were identified as we considered organizational structures and hierarchies – this information prompted us to look 'within' stakeholder groups for nuances in opinions and agendas – as well as representation bodies, formal or informal (professional organizations or stakeholders identified as 'speaking on behalf of' other stakeholders) – cf. Principle 3.
	Explore how (and why) stakeholders relate to the IS studied	The NHSnet/N3 was central to our research agenda, so interviews explicitly addressed stakeholder views about it. Alongside, we noted general attitudes of stakeholders towards IS (e.g., awareness of issues, familiarity and frequency of use were raised in interview discussions), and the role of local context in IS use (e.g., the turnover of patient population in a general practice influenced the use of

		electronic patient records).
3. Different stakeholders (even within the same 'stakeholder group') may have different values and perspectives – these may be explicit, implicit or hidden	Adopt an interpretive stance in eliciting and interpreting stakeholder viewpoints	We followed an interpretive research approach, following the principles of Klein and Myers (1999). A stakeholder who holds strong views on a debate is often anxious to share and justify them in the interview setting – the researcher can at times be viewed as an ally, someone that will publicize (present or publish) the stakeholder's perspective. Clearly, this exchange of information depends on the relationship between interviewer and interviewee. Nonetheless, not all stakeholders will reveal their actual views and several may have hidden agendas.
	Invite stakeholders to comment on who share/challenge their views	This was part of our research agenda and occasionally pointed to hidden agendas or triggered responses (at times emotional) to confirm or counter interests attributed by other stakeholders.
	Acknowledge the interests attributed to the stakeholders by others	Following from the previous, we parsed our data for evidence of this during data analysis. Hidden agendas are difficult for a researcher to unveil, but may be more transparent when the research in the stakeholder relations and debates takes place over an extensive period.
	Explore how different stakeholder groups are represented (representation bodies are an additional stakeholder, and may develop a separate agenda to the group they represent) – and whether this representation is considered legitimate	Similar to Principle 2, different types of roles and identities are considered for each stakeholder. Divergence of perceptions within the same stakeholder group was also something we considered during data analysis.
4. Stakeholder roles, perspectives and alliances may change over time	Adopt a longitudinal approach	In addition to following the entry and exit of stakeholder groups (cf. Principle 1), we noted changes in perspectives and alliances over time. While some changes are natural over time (e.g., maturing use of IS), some stereotypes and antagonistic stakeholder relations prevail. These can be identified in the data analysis, as a benefit of access to longitudinal data.
	Ask stakeholders about how the phenomenon studied and the related perceptions have evolved	This was part of our research agenda. The stakeholders' sensemaking of changes adds to the richness of the data and interpretations.
5. Stakeholders relations and power matter in the shifts in their roles, perceptions and alliances	Ask stakeholders to identify other relevant stakeholders and investigate why they consider them as such, what role they play and why.	This was part of our research agenda (cf. Principle 1).
	Discuss if and why these change over time	This was part of our research agenda (cf. Principle 4).
	Identify debates and arguments for (and against) specific issues related to the phenomenon studied	Key debates and arguments were presented primarily by stakeholders who felt strongly – whether favorably or unfavorably – about the NHSnet/N3. Key debates typically attracted public interest, given the public nature of the network, and were therefore also prominently portrayed in secondary data sources (see the end of Section 3), such as the press, professional magazines and mailing lists.
	Interpret this data with an eye for alliances and histories (cf.	In data analysis, we considered how stakeholders, within and across groups

previous principle)	positioned themselves in the prevailing debates about the NHSnet/N3.
Explore *why* the particular stakeholder opinions and interests are reported	As noted earlier, stakeholders are vocal about issues that matter to them. Eliciting honest responses, however, largely depends on the relationship built between researcher and respondent. The possibility to juxtapose responses from multiple stakeholders, within and across groups, over time, contributes to a better understanding of stakeholder motives.

Data collection and analysis

The setting for our interpretive stakeholder analysis is the UK NHS, which is a federated organizational structure (NHS Confederation, 2013). The NHS is routinely described as a 'political football' as politicians constantly introduce policies to restructure and re-configure patient care. As a large and complex organization, the task of identifying key stakeholders is a 'the first step in a stakeholder analysis' (Brugha and Varvasovsky, 2000). However, the focus of our study was to examine the policy and implementation of a large-scale health IT initiative across the NHS over an extended period. This involved the input of multiple stakeholders, including politicians, medical professional and patient representatives, parties who work outside the NHS, and also management consultants and media, both of whom exert their influence to seek change in this organization. So, to gain a wider appreciation of the stakeholder landscape, it was essential to identify the key stakeholder groups, and to examine their roles and perceptions, acknowledging (cf. Principle 3) that these stakeholder groups need not be homogeneous.

Following the interpretive stakeholder analysis research approach summarized in Table 2, a series of open-ended, semi–structured and unstructured in–depth interviews were carried out with stakeholders, as the latter were incrementally identified through the research process, over a fifteen year period (1995 – 2010). Interviews are instrumental in qualitative research approaches and are particularly appropriate for accommodating stakeholder views: "the goal of any qualitative research interview is to see the research topic *from the perspective of the interviewee*, and to understand how and why he or she comes to have this particular perspective" (King 1994, p. 14, our emphasis).

A topic guide was used to support the interview process. This included open questions prompting the stakeholders to discuss their views on the NHSnet in Phase I (1995–2001) and on the transition to its successor, the N3, following the launch of the NPfIT in Phase II (2002 – 2010) of the research, discussing the respondents' involvement with the networks; their views of who other stakeholders were and how they were involved; the networks' development and evolution; their impact and related issues, efficiencies and inefficiencies, successes and failures. We should stress that our study was not overly concerned with the final outcome of the NHS N3 system, or with offering practitioners a 'stakeholder toolbox of techniques' for use by healthcare managers, to reflect the managerial perspective of the majority of stakeholder theory. Rather, our study aims to understand the roles and perceptions of multiple stakeholders, and their entangled interrelations and intertwined agendas, rather than the priorities, stakes and preferences of individual stakeholders.

Stakeholders were invited to identify other relevant stakeholder groups and present their views on their interrelations as well as to reflect on aspects of the National Program for IT and related policies that have changed over the years, as we showed in Table 2. Thus, although our study did not start out as longitudinal, the methodological approach used ensured that a range of stakeholders were interviewed about the same IS project implementation, that is, the virtual private network developed to support data exchange among all NHS organizations, over a period of 15 years.

Interviewees included stakeholders from multiple stakeholder groups that were incrementally identified in the course of this research. The 'obvious' starting point were NHS bodies leading the initiative for the NHSnet/N3 and the NHS members (primarily GPs) that were considered key users of the network services. Some of the stakeholder groups (including doctors, hospital management and members of the British Medical Association) were consistently recognized as primary stakeholders by others, so multiple individuals were interviewed. Thirty formal and forty informal interviews were conducted in total during the period 1995–2001 (Phase I); a further eighty-five interviews were conducted during the period 2002 – 2010, including respondents in 10 NHS hospitals in the (original) five NPfIT regions of England, following the launch of the National Program for IT (Phase II). Interviewees are listed in Table 4 in the next section, where stakeholders are presented (we do not provide specific counts per group, as many of our respondents held multiple roles); Table 4 also indicates where secondary sources were used to provide additional evidence for the role and views of a stakeholder group. Most of the formal interviews were tape–recorded and their average duration was between one and a half and two hours. Hand–written notes were taken for the interviews that were not tape–recorded. Informal interviews were not arranged beforehand, were shorter in duration and were usually conducted alongside events related to the use of information systems in healthcare. In all cases, care was taken to transcribe or produce a report shortly after the interview, typically on the same day.

Because of the complexity of the research domain, a variety of data sources were collected to support the interview data, allowing for a richer insight of the research context (see Table 3). For example, for some of the identified stakeholders, such as political figures, an interview was not always possible. In such cases, references in official documents, public speeches and the commentary of other stakeholders (for example, specialist mailing lists like the GP–UK list) were used. Appendix 1 provides sample extracts from secondary sources that supported our stakeholder identification and our data collection. Given the wide array of stakeholders involved in the NHS N3 network, our approach focused on showing how

diverse views among different stakeholder groups are likely to interrelate and fluctuate over time depending on many factors, including political, professional, cost and technical imperatives. We present our data and analysis of the NHS N3 in the next section, starting with an overview of the network's infrastructure.

Table 3. Secondary data collection sources

Type of Data	Data Source
Government Reports/websites	Department of Health (www.dh.gov.uk) NHS Executive Connecting for Health (www.connectingforhealth.nhs.uk) n3.nhs.uk UK Parliament (www.parliament.uk)
Independent Reports	National Audit Office (NAO) British Computer Society Caldicott Committee
Hospital Reports	Annual Reports (many are publicly available)
Newspaper articles	Financial Times, Other 'Broadsheet' daily newspapers, Local newspapers, NHS news.
Practitioner journals	British Journal of Healthcare Computing & Information Management Network News Computing
Mailing lists	gp-uk mailing list
Websites of patient representation groups	http://www.patients-association.com/ http://www.napp.org.uk/ http://www.npsa.nhs.uk/ http://www.npsf.org/

5. THE NHS N3 NETWORK INFRASTRUCTURE

A key aspect of the NHS Information Management and Technology (IM&T) strategy in the early 1990s was the NHSnet infrastructure, designed to enable information exchange among NHS members in a secure and efficient manner. It was proposed in the context of the NHS-Wide Networking project in 1993 and was in place by 1996. Since the National Program for IT ("NPfIT" or "The Program") replaced the IM&T strategy in 2002, 'the National Network for the NHS' or 'the New NHS Network' ("N3") replaced the NHSnet, as a fast, reliable and secure broadband network to transfer data between all NHS organizations. An important feature was to ensure that, as the volume of traffic increases, the quality and reliability of each individual connection would not decrease. As one of the largest virtual private networks in Europe presently, with over 50,000 connections (30,000 GPs to almost 300 hospitals in England), the NHS N3 would become the internet gateway for the NHS, serving around 1.3 million employees.

The NHS N3 is a wide area IP network (WAN) connecting many different sites across the NHS in England & Scotland. It also connects to other networks via 'Gateways', mainly via

the Internet. It is described as the 'backbone' of the NHS IT infrastructure which supports the major components of the NPfIT, which included: the National Care Records Service (NCRS), the Electronic Transfer of Prescriptions (ETP), Choose and Book (an electronic appointments service to connect GPs with hospital and other medical organizations), and the Picture Archiving and Communications System (PACs) for digital images (e.g. X-rays and scans). These systems would hold demographic data about every citizen in England (around 50 million people). This would include, name, address, registered GP, and the unique NHS number given to every person at birth. This number would allow the anonymization of medical records and the functionality to link records stored in different locations to facilitate quality of care and research activity (Chantler, Clarke and Granger, 2006).

The next section illustrates the numerous relevant stakeholder groups identified in the course of our longitudinal research, while the NHSnet, and then the NHS N3, were developed and implemented.

NHSnet and N3 Stakeholders

In the context of the NHS, it is quite clear that the stakeholder landscape is constantly changing (cf. Principles 1 and 4), not least because, throughout the history of the NHS, government ministers have sought to restructure the institution. For example, the executive/managerial domain, with primary care trusts (PCTs) and strategic health authorities (SHAs) introduced in 2002 are undergoing further restructuring in 2006, with their abolishment and replacement with clinical commissioning groups (CCGs) in 2013. The plan is for NHS services to be opened up to further competition from providers that comply with NHS standards on price, quality and safety. With the plan for the majority of hospitals and NHS trusts to become "foundation trusts", the potential to increase stakeholders groups is likely, particularly as government is now encouraging greater involvement of patients to 'have their say' about NHS services. Moreover, local authorities will adopt a larger role, becoming responsible for budgets for public health. Health and wellbeing boards will encourage integration between commissioners of services across health, social care, public health and children's services, involving democratically elected representatives of local people. Local authorities will further work with other health and care providers, community groups and agencies (Brennon, 2005; Currie, 2012, 2014).

Table 4 gives a breakdown of NHSnet and N3 stakeholders (hereafter jointly referred to as N3 stakeholders) that we have identified, following and refining the research approach presented in Table 2, over the course of our 15-year research. In the Table, to enhance readability, we list stakeholder groups in 8 broader categories, related to their role in the

healthcare context. We also indicate which stakeholder groups have been interviewed in each of the two phases of the research (before and after the launch of the NPfIT). For simplicity, we present together some groups whose names and responsibilities were revised or restructured over the course of our study without an impact for our study (e.g., the scope of geographical coverage and responsibilities of Trusts and health authorities changed, but not their stake in the N3).

The distinction between respondents between the two periods signals that stakeholder groups were added or removed (e.g., Health and well-being boards were established recently, whereas the Information Management Group of the NHS Executive ceased to exist in 2002) or that the set of relevant stakeholders changed as different debates on the network came to the fore (cf. Principle 1). Stakeholder organizations that were dissolved or formed at a later time of the study period are marked as not available (n/a) where appropriate in Table 4. For example, a fierce debate on patient data confidentiality in the mid 1990s meant privacy activists, security consultants to the BMA, the Data Protection Registrar and the UK Government Communications Headquarters (GCHQ), that is, one of the three UK Intelligence Agencies, became engaged with NHSnet, but became less visible when the debate receded; some re-entered the scene when new privacy concerns emerged. In contrast, the Caldicott Committee that was convened as a result of the concern about the use of patient information in the NHS, and produced "The Caldicott Report" in 1997, was re-convened in 2012, in response to the changing infrastructure and renewed concerns over patient data confidentiality, “to lead an independent from Government review of the balance between protecting patient information and its sharing, to improve patient care” (Department of Health, 2012). A detailed presentation of the role for the stakeholders listed in Table 4 is presented in Appendix 2 (second column).

Table 4 also refers to the secondary sources used, noting which stakeholder group’s views were quoted or commented on in the various secondary sources collected as part of our research. For example, the press and practitioner journals referred to the conflict between the Information Management Group and the BMA; the gp-uk mailing list reported views of GPs and the Doctors Independent Network and commented on the role of Patient Associations, and so on. Secondary resources have been studied and used invariably throughout the research period (cf. Appendix 1), so they are not presented separately for the two research phases.

Table 4. The NHS N3 Stakeholder groups

Domain	NHS N3 Stakeholders (Names of some authorities and groups have changed over the course of the research)	Access to stakeholder views via:		
		Phase I interviews	Phase II interviews	Secondary sources
Medical Professionals	primary care –general practitioners (GPs)– and hospital doctors (Consultants)	✓	✓	✓
	Nursing staff	✓	✓	✓
			✓	✓
Executive/ Managerial	Primary Care Trusts (PCTs)	✓	✓	✓
	Hospital Trusts	✓	✓	
	Strategic Health Authorities (SHAs)	✓	✓	✓
	NHS Executive	✓	✓	✓
	Information Management Group (of NHSE)	✓	✓	✓
Health Representative Organizations	National/regional and local medical and pharmaceutical committees	✓	✓	
	National/local user representative groups	✓	✓	✓
	British Medical Association (BMA)	✓	✓	✓
	The Pharmaceutical Services Negotiating Committee (PSNC)	✓	✓	
	Patient Associations and Patient Groups		✓	✓
Health Industry and Support	Pharmacists	✓	✓	✓
	Pharmaceutical companies		✓	
Government Agencies	Department of Health/Connecting for Health	✓	✓	✓
	British Parliament/ Members of Parliament	✓	✓	✓
Independent agencies, societies and associations	Privacy activists	✓	✓	✓
	British Computer Society	✓	✓	✓
Technology Suppliers	Hospital ICT professionals	✓	✓	✓
	Contracted ICT suppliers	✓	✓	✓
Researchers and Media (stakeholders reporting on the context)	Health Industry Researchers	✓	✓	✓
	Health Industry Publications	✓	✓	✓
	National/Local newspapers	✓	✓	✓

Against the backdrop of a complex NHS, the continuous ebbs and flows of the NHS N3 network infrastructure, under the auspices of a highly complex and ambitious national strategy for IT use in healthcare (articulated in the NPfIT since 2002), pointed to the need for a more nuanced approach to understand the roles and perceptions of different stakeholders, and how their positions or stakes were likely to alter throughout the duration of the Program.

Entangled Stakeholder Roles and Perceptions in a Contested N3

Prior research has focused on the difficulties of introducing large scale IT into the public sector (Willcocks and Currie, 1997) with healthcare being no exception, as multiple stakeholders hold varying positions of power and influence which can sometimes derail IT projects (Boonstra et al., 2008; Currie, 2012). Our initial empirical data from the 1990s suggested there was general support for introducing new technology into the NHS,

acknowledging the need to improve health service delivery, from the clinical, the managerial and the government respondents. This was reinforced in a number of government statements which emphasized the importance of the emerging Internet economy.

Despite the shared understanding of the need for better information management in the NHS, our data collection showed that the NHS N3 was not without controversy, with stakeholder groups holding different roles and perceptions of the network, some favorable and others less so. Different opinions were expressed about the NHS N3 even among the same group of stakeholders (Principle 3). For example, some clinical stakeholders, notably General Practitioners (GPs), were among the most outspoken in their comments about the NHS N3. Representative organizations, such as the British Medical Association (BMA) also raised concerns about the implications of its use. Yet other groups, including patients and many sections of the medical community (i.e. hospital doctors), were unaware of the national plan to introduce the NHS N3 or its implications. Our interviews with clinicians across several hospital sites revealed a surprising lack of knowledge about the NHS N3 Network and its intended use, which was to provide the technical backbone for the NCRS (electronic patient records). Even as late as 2008, clinicians often voiced the same comment, “I don’t know much about the large computer project planned by central government. I regularly see consultants at this hospital, but I really don’t know what they are doing. I have heard that we will be using more electronic patient systems, and I have some concerns about how this will work in practice”.

A highly visible area of concern and debate, where such differences were observed in our study, concerns patient data privacy. Personal health data is a very sensitive area within the NHS. More specifically, clinical data about mental and sexual health are extremely sensitive, with patients in our sample admitting to visiting private clinics to avoid discussing issues of ‘work-based stress’ with their local GP. Equally, patients with a sexually transmitted disease (STD), especially HIV/AIDs, used private clinics for similar reasons; these clinics do not participate in the NHS N3. This is an interesting finding since it suggests a fragmented repository of patient data is not (cannot be) accessed through the network. The BMA, recruiting allies from the security consultancy field and privacy activists, strongly opposed to the weak provisions of the NHSnet in the mid 1990s, stating that they were acting ‘in the interest of patients’ (Principle 2). Clinicians with less engagement with the network continued to express their concerns informally about ‘the need for security and confidentiality of patient data’ and effective controls over who has access to the NHS patient database in the decade that followed. The potential interest for gaining access to the NHS N3 network among stakeholders to view patient data was perceived to be very large. These concerns were

heightened over the course of time in the context of patient data being accessible via remotely held databases, such as cloud computing. Further, clinicians and patient groups expressed concerns about the public-private intersection of accessing patient data, and the possibility that patient data could be 'co-mingled' with other data sources unless it was properly segmented.

A further issue which was expressed by clinicians and patient groups was the potential for commercial exploitation of patient data held on a private network. Interviews with clinicians pointed to serious reservations about, IT companies selling off patient data to other commercial firms. Again, these issues point to information governance, regulation and compliance and, more crucially, who is in charge of these areas. A related area was the potential increase in health tourism, especially in the European Union, where patients seek faster and cheaper treatments for both chronic and acute conditions. Whilst the European Union is putting in place new directives and laws on the cross-border transfer of European citizens' patient data, each of the 28 EU Member States has its own laws and requirements which continue to be revised (Seddon and Currie, 2013). Currently, the technology is ahead of the legal and regulatory landscape, so patient data is protected (or otherwise) under the jurisdiction of the country where it is collected (European Union, 2011). These issues were picked up by several clinicians and hospital administrators who expressed concerns about how patient data would be protected in the future.

A further complexity to the NHSnet and the N3 are the changes to the stakeholders, whether internal to the NHS and contractors, involved in the development and maintenance of the network (Principles 1 and 4). Internally, the Information Management Group of the NHS Executive was dismantled and replaced by the NHS Information Authority in 1999, soon after the NHSNet became available. In 2005, the NHS Information Authority was superseded by 'Connecting for Health' which, in turn, ceased to exist in 2013. The stakeholder landscape also included a large private company (British Telecom) and other IT sub-contractors. Throughout the NPfIT, the letting of large government contracts to external firms was not without problems, particularly as two firms (Accenture and Fujitsu) eventually pulled out of the Program. Stakeholder interests of commercial firms were critically important, particularly as clinical/patient incentives needed to be aligned with corporate/supplier incentives. Our data showed that much of the focus of Connecting for Health in negotiating with commercial firms was around procurement and cost reduction. While the value for money aspects are important to any large scale IT project, such an emphasis was interpreted by medical staff to be at the detriment of clinical and patient engagement. Indeed, these observations were borne out in the two National Audit Office reports (2006, 2008) which shifted the policy-

making on the NPfIT towards more clinical involvement and benefits realization from health IT.

A further observation is that different stakeholder groups occupied varying positions during the design, development and implementation of the NHS N3 system (Principle 4). For example, politicians were actively engaged at the policy-making stage, i.e., the decision to launch the NPfIT. However, their role was likely to change at post-implementation, with politicians from the various political parties occupying either an unfavorable or favorable disposition towards the progress or lack of progress of the NHS N3, or NPfIT more generally. Such political positions would not always remain consistent, as they were influenced by particular political circumstance (Principle 5). Successive interviews suggested that policy-makers often engaged in knee-jerk reactions, as implementation delays led to the policy revisions, i.e., the need for more user engagement (i.e., of clinicians) and greater attention to benefits realization and selling the value proposition more widely (see National Audit Office reports, 2006, 2008). The change in roles also applied to large professional bodies, such as the BMA, who became very concerned about the patient safety issues, and for commercial firms, who were expected to meet stringent implementation deadlines throughout the duration of the NPfIT.

From our primary and secondary data sources, it was apparent that as the NHSNet transitioned to become the N3 Network, the varying array of positive and negative views and perceptions expressed by multiple stakeholders produced a complex and often confusing picture of how this program was being implemented. The NAO reports (2006, 2008) were generally supportive, yet expressed concerns that more needed to be done to engage stakeholders. Ironically, many stakeholders were engaged, but in a negative sense, as they demonstrated high levels of resistance to the NPfIT program as a whole, with most criticism targeted to how the N3 Network would guarantee security of health (patient) data. To capture the essence of this scenario, we present a heuristic representation of stakeholder engagement with the N3 and perceptions in the next section.

A Heuristic Representation of Stakeholder Engagement and Perceptions

Following from the brief overview of stakeholder roles, involvement with the N3 and perceptions about the network in the previous section, it becomes clear these have changed repeatedly over time, in line the stakeholder principles we proposed. To capture the range of potential stakeholder views so that we can discuss stakeholder engagement in a more holistic sense, we developed a heuristic representation along two dimensions, as shown in Figure 1. These two dimensions allow us to depict two important elements of the various

debates that emerged alongside the evolution and use of the network: on the one hand, stakeholder engagement in the NHS N3 – to what extent were stakeholders involved in the evolution, the use and the debates on the network (vertical axis) – and, on the other hand, stakeholder perceptions of the NHS N3 – to what extent were stakeholders favorably or unfavorably disposed towards the network (horizontal axis). Using these dimensions, stakeholders can be grouped in five distinct types forming a U–shaped curve. The circles in the diagram represent the position a stakeholder group may hold at a particular point in time. The heuristic enabled us to make sense of and compare stakeholder positions at a certain point in time, and, to depict simply how stakeholder engagement and perceptions may shift over time.

The relationship between stakeholder engagement and stakeholder perceptions is an important one, both theoretically and empirically. Within the IS field generally, much attention is placed on the role of the 'user' of information systems, particularly in how users adopt and adapt to working with new technology. While this approach makes a significant contribution, it may not generate findings which explain why some people never become users. Within health IT, an over-simple conclusion may be that clinicians are resistant to change. However, our research did not entirely support this finding. A common viewpoint was thus, "I am in favor of using IT, but I am not part of the decision-making, so I cannot comment whether the IT strategy will work or not" (Hospital Consultant, London Teaching Hospital, UK). A person taking this position could therefore be described as, a potential user, currently holding conflicted views about an intended health IT program. Further, the fluctuations in policy-making, implementation deadlines and revisions about the NPfIT became well documented in a range of government sponsored reports (NAO, 2006, 2008).

Another important observation from our data was that members of the same stakeholder group could demonstrate differing opinions, with some interviews holding positive views about the NHS N3 network, and others voicing contradictory opinions. Our objective was not to capture each and every comment from the same stakeholder group, but to demonstrate how shifting positions and stakes across the health IT landscape can change over time.

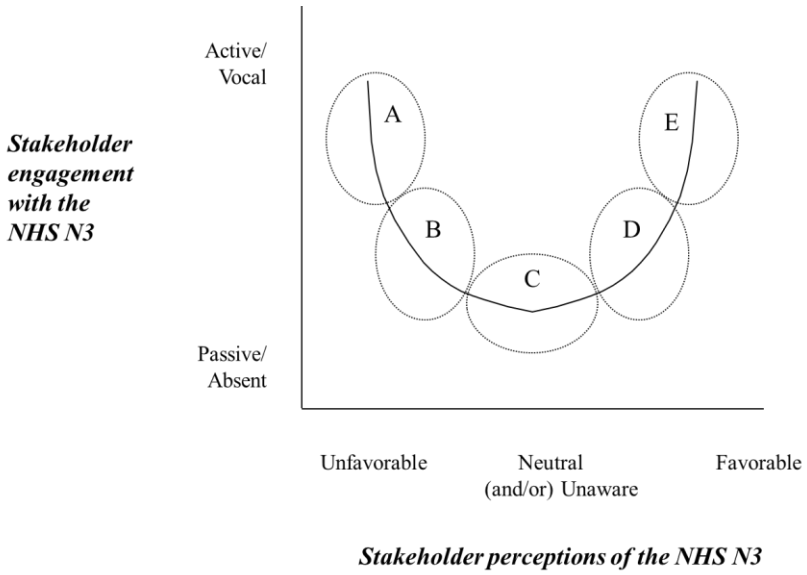

Figure 1 A heuristic of stakeholder roles and perceptions of the NHS N3

Figure 1 is a graphic device to assist in the exploration and understanding of social phenomena. Our heuristic representation embeds our assumptions derived from extant empirical research. Methodologically, the use of ideal types sets out the defining characteristics of a social phenomenon, i.e., its salient features which are presented as clearly and explicitly as possible and form our preliminary analysis. This approach is particularly helpful in studies of social change, by defining benchmarks, around which variation and differences can then be situated. Our heuristic of stakeholder roles and perceptions is therefore presented to assist analytical clarity, and possibly for explanatory value as a model (Gerth and Mills, 1958).

As we show in Figure 1, each of the categories, from A to E represent an ideal-typical position where stakeholder groups, at any given time, may be located. This framework is not a static representation, as stakeholders may shift their position depending upon the ebbs and flows of implementing the policy driving the NHS N3 Program. As a high level illustration, the diagram is intended to capture the aggregated views of stakeholder groups, rather than individual perceptions relating to the Program. Our intension is to present the most significant shifts in engagement and perceptions aggregated across the various stakeholder groups, and show that, in line with Principle 4 –stakeholder groups appear to be statically placed in 'positions' A to E, but this may change over the course of a introducing a large scale IT program. Similarly, stakeholder groups are not homogenous in the positions and stakes they may hold, in line with Principle 3. Our interest here is therefore to determine

empirically how the five positions, illustrated in Figure 1, may shift over time. We provide further explanation of each ideal type below:-

'A' type stakeholders are those who were actively opposed to the NHS N3, expressing dissatisfaction about the policy, development and implementation of the Program. This position illustrates a stakeholder group that become vocal in their dissatisfaction about the Program. Stakeholders in this category increased over time and ranged from privacy activists, the media, technology suppliers, medical professionals and health representative organizations. Our data found that, as the NHSNet transitioned to become, the NHS N3, with much larger government funds committed to the overall NPfIT, the increased budget appeared to attract more heated discussions among different stakeholder groups about 'value for money', and whether the government should be spending large amounts on 'computerizing the health service'.

One observation from carrying out this research was that medical professionals were both part of, and represented by powerful professional bodies. For example, the British Medical Association and the British Computer Society were actively engaged in working with health and IT professionals, respectively with the shared concern about the use and transfer of patient data over a private network. Our interview data suggest that much of the concern from medical professionals was due to lack of perceived involvement with the policy and decision making for the NHS N3. One clinician said,

"The electronic storage and transfer of clinical patient data has all sorts of implications. In the USA, the lawyers are waiting for electronic health records (EHRs) to take shape, mainly because they see an increased market for professional misconduct in healthcare, particularly as everything will be documented. In the UK, we are less concerned about these issues, but more concerned about the patient safety aspects of using electronic systems – and who has access to the network" (Clinician, London Teaching Hospital).

Other stakeholders who were actively opposed to the NPfIT included various independent research and advocacy groups. These voices of dissent were largely focused around the potential lack of privacy, security and confidentiality of data. In some cases, medical professionals and medical researchers surveying doctors' opinions came together for a common cause to express concern about patient data being misused by commercial firms or even individuals working in the NHS with direct access to electronic patient files. While it is outside the scope of the present paper to adequately cover the complex issues of the current privacy debate within the European Union and elsewhere, the legal and regulatory

framework was very much behind the technological curve. This led to much confusion about patients' rights over their data and who should own the patient record. However, the concerns were invariably expressed as worries over the introduction of new technology, rather than articulated as health policy and legal matters. At the very extreme, calls were voiced to terminate the uploading of patient records on the "spine" (i.e., the NHS N3 network) despite the obvious benefits of using such a network for less politically contentious activities (i.e., the PACs for transferring x-rays and scans between health professionals).

As the first National Audit Office Report of the NPfIT was published in 2006 (NAO, 2006) dissent among clinicians, their representatives (BMA), patient groups and the media increased, with open letters published in the media about the 'scandalous' waste of money spent on the Program. Media reports often referred to the NPfIT as a 'computer failure' and were tardy in their attempts to delineate the various IT systems under this umbrella term (for which NHS N3 was only one of five). Further NAO (2008, 2011) reports did little to assuage the concerns of stakeholder dissent, with many calling for the termination of the entire Program.

'B' type stakeholders were represented by large groups of stakeholders, yet did not exercise their rights or positions as active dissenters. Many groups, including NHS executives/managers, health representative organizations, medical professionals and even some sections of the media, were generally ill-disposed to the NPfIT as a whole, and to the NHS N3, to a lesser extent, on the grounds that it was "a waste of money" and "lacked proper security" of patient data. In the media, stakeholder interest was alerted to the decision to prioritize expenditure on "computer systems" rather than on direct services to patients (i.e., reducing patient waiting times, giving patients access to expensive medicines, keeping open local hospitals, etc). While these stakeholders rarely expressed direct dissatisfaction with the NHS N3, their unfavorable views were more generally leveled at health policy-makers and how health choices were prioritized by politicians and NHS executives.

Other stakeholders voiced their concerns about the poor technical infrastructure, particularly the speed with which traffic could flow over the network. Some clinicians expressed dissatisfaction about the speed of the network and questioned the wisdom of *"having to join a network with such poor performance and functionality"* (Statement by a GP in the GP–UK mailing list). Clearly, comments of this nature reflect the current progress of the IT infrastructure. Throughout the period from the late 1990s to the end of 2010, the IT infrastructure (Internet and broadband) speeds vastly increased, which suggested that

unfavorable user perceptions of the NHS N3 shifted to become more positive, or sought alternative arguments to justify their negative predisposition to the network.

Another observation of those who were passive stakeholders yet held somewhat unfavorable views about the NPfIT included people who were ill-informed. In the first four years of the NPfIT, it was interesting to observe how the users of the NHS N3 and the various applications that would run over this large IT infrastructure, were likely to be the least informed. Medical professionals and their representatives, without detailed knowledge of the aims and objectives of the NPfIT, were likely to form a negative perception of how health IT policy would be translated into practice, as opposed to those who were fully informed. Again, negative views were played out in the media as clinicians' voicing their opinions against the development of a computer project, rather than about how it would either improve or adversely affect patient safety and outcomes. One comment from a hospital doctor suggested,

"It's not that doctors are against the introduction of IT in healthcare. We just haven't been informed about the clinical or business case for the NPfIT. Some doctors are worried about uploading patient data on a large computer network. My concerns are not just about security but how these records may be used, and possibly changed by health professionals and even patients". (Hospital Doctor, Local Hospital, NW England).

This group of stakeholders were a 'silent majority' of the N3 users – throughout the research period. While they did not actively call for the termination of the NPfIT through their medical representations, or even during our empirical data collection, their reservations were expressed often in conjunction with other factors, for example, "The NHS should be spending money on other priorities" (GP, London, SE), "I am concerned about patient data security using a national network" (Hospital Consultant, Midlands), "I don't really know enough about it and it may increase our workload" (Nurse, London Teaching Hospital).

'C' type stakeholders occupied a neutral position in the NHS N3 and were likely to have an indifferent view about the Program. The perception that *"I'm not entirely aware…"* was commonplace. An Interview with the pharmaceutical advisor of a health authority stated, *"We don't follow their stuff; … [it's] outside my own league"* (Chief pharmacist in a large London hospital trust).

A revealing finding was that health representative organizations, particularly those representing patient groups, commented that patients knew very little about the Program.

Out of a possible 50 million potential patient users in England, clinical leads representing government agencies, such as Connecting for Health, confirmed that patients were not the main stakeholder group to be 'won over', as more priority was given to getting medical professionals on board. Patient groups expressed concerns that while the NPfIT was promoted as a leading IT innovation in healthcare, the expected beneficiaries – the patients – had little or no knowledge of how they could benefit from the initiative. This is ironic given that patients are increasingly encouraged by the government to become 'actively engaged' in their healthcare. Interviews with patients and patient groups from 2002 to 2010 found complete lack of information about the NPfIT. For example, the fact that patients in England could access their electronic health record (EHR) (using HealthSpace) was not widely known.

A related issue from a GP stressed, "The issue is whether the patient actually knows what is happening with their data, where it is being kept. At the present there appears to be no formal attempt to inform the patient of where the information is going". (Statement by a GP and chairman of the IT committee of the General Medical Services Committee).

Nurses and their representative organizations were also 'in the dark' about the benefits and risks of the NHS N3. One nurse said, "Even though we (nurses) are active users of computers, we are the last to find out about new systems and the last to be trained. I don't really know much about the NHS N3 system so I can't really comment" (Nurse, SE England GP Practice).

To move towards a more favorable outlook towards the NHS N3, it was important for politicians and NHS executives to "manage expectations". While Connecting for Health were keen to promote best practice in procurement and contracting of IT systems, more needed to be done to convince stakeholder groups about the prospective benefits of the NPfIT. A fast, reliable and secure IT infrastructure was an important innovation in a healthcare sector characterized by years of under-investment in IT (compared with finance and manufacturing) (Wanless, 2002), but how the message was positioned to stakeholder groups was just an important as getting the technical factors right.

'D' type stakeholders, while not being actively engaged in the NHS N3, generally supported the drive to introduce new technology into healthcare. Many voiced comments such as, "…you should weigh the risks against the benefits that patients would be receiving, and that is my view - the benefits for the patients outweigh the risks". (Statement by a GP in the GP–UK mailing list)

By the mid-2000s, it was apparent that the NPfIT was undergoing some serious delays and setbacks (NAO, 2006, 2008). This activated many politicians to voice “serious concerns” about the entire NPfIT program. Delays to making progress on the Choose and Book, Electronic Transmission of Prescriptions (ETP), Picture Archiving and Communications Systems (PACs) and the NHS Care Records Service (NHS CRS) were inextricably linked to the further progress of the NHS N3. Politicians continued to express their support of the NPfIT, yet recognized that more work needed to be done to “get the clinicians on board”.

The agency in charge of the NPfIT, Connecting for Health, published favorable literature about the NPfIT which was sent to NHS organizations. Such a passive approach was not seen to be effective by many, despite stakeholder support from some quarters. General support for the ‘digital economy’ and ‘health innovation’ was expressed by the European Union, with large scale funding opportunities to research health and IT. UK government ministers also expressed support for the NPfIT although a sizable number from other political parties expressed negative views. The IT industry also gave their support for ‘more investment’ in health IT. One notable publication was the Wanless Report (2002) which gave examples of how financial services spent vastly more money on IT compared with public health. Type ‘D’ stakeholders often supported the *concept* of innovation in healthcare, if not the policy and planning. IT was described as “Progress” and “Important for modernizing the health sector” (Clinical Lead for Connecting for Health, London). Such bland statements, however, were not followed up with active participation in the NPfIT by this stakeholder category.

‘E’ type stakeholders were largely made up of the initiators of the NHS networking program in Phase I (notably the NHS Management Executive) and the politicians in support of the Program and the many Clinical Leads appointed by the government to act as ambassadors of the NPfIT. Roadshows and various events represented by Connecting for Health staff were designed to win the ‘hearts and minds’ of stakeholders. However, our observations showed that vast numbers of medical professionals continued to be unaware of the NPfIT, in spite of greater interest to move healthcare from diagnosis, treatment and cure towards preventive health and wellbeing. Type ‘E’ stakeholders were a diminishing group. Our empirical evidence to support this was derived over several years of interviews and close attention to documented sources, such as the NAO publications, the media reports, statements to the media from the BMA, patient groups, and other sources. One clinical lead for the NPfIT noted, “I know that many of my clinical colleagues are against the NPfIT, but it is my job to ‘sell the policy’. Doctors can be very conservative with a small ‘c’ and they don’t

like change". (Clinical Lead, Interview carried out in the Midlands). This group of stakeholders decreased over time with some acceleration up till 2010 when the conservative government introduced policies to make cuts in public spending. The third NAO report (2011) further pointed to failure to meet implementation targets set earlier in the Program and an additional problem of lack of stakeholder engagement. In fact, the failure to engage key stakeholders had beset the NPfIT since its inception.

Shifting Positions and Stakes - Phase I

To illustrate how the above stakeholder diagram can be used to depict the dynamic movement of stakeholder groups, we summarize our findings in three diagrams covering the two important phases of health IT policy implementation where the technology was initially labelled, the NHSNet to be renamed after the launch of the NPfIT in 2002 as the NHS N3. Our eight main stakeholder groups are presented in each diagram, where we illustrate how their respective positions altered over time. Our theorization does not extend to detailed causal explanations about why a particular stakeholder group shifted its position. Rather, our illustration is to demonstrate the importance of identifying different key stakeholder groups and how they engage (or dis-engage) with a large scale, government funded IT program, over an extended period of time. This is an important methodological point since research enquiry which covers a limited time period, for example - the launch of a program - may not reveal the potential for some stakeholder groups, who are initially not engaged, to become actively vocal in their concerns about a program.

Figure 2 presents the stakeholder groups at the launch of the NHS-Wide Networking project in Phase 1 which covered the period 1993-1995. Here, key stakeholders, notably the government agencies who spearheaded the NPfIT, engaged the services of the various technology suppliers to bid for large contracts to develop health IT networks. The NHS-Wide Networking project promoted health IT as a means to improve health service delivery. Not surprisingly, the outlook for the project was optimistic and was formally articulated in the relevant NHS literature, as "enabling all parts of the NHS to communicate with each other efficiently, securely and cost-effectively" [IMG Reference B2127, NHS Executive, 1994]. At the time, the intended users of the system, notably the GPs, adopted a 'wait and see' attitude. This was witnessed in the mixed views reported by our interviewees: GPs recognized the need for improvement in the exchange of information within the NHS while also maintaining some skepticism about a new initiative 'led from the center'.

During this initial phase, other stakeholder groups adopted 'mixed positions', with some medical professionals, for example, in favor of the NHSNet, others remaining neutral, and

still others voicing some concerns. One of the most vocal stakeholder groups was privacy activists, who continued to caution against developing electronic networks to house medical records.

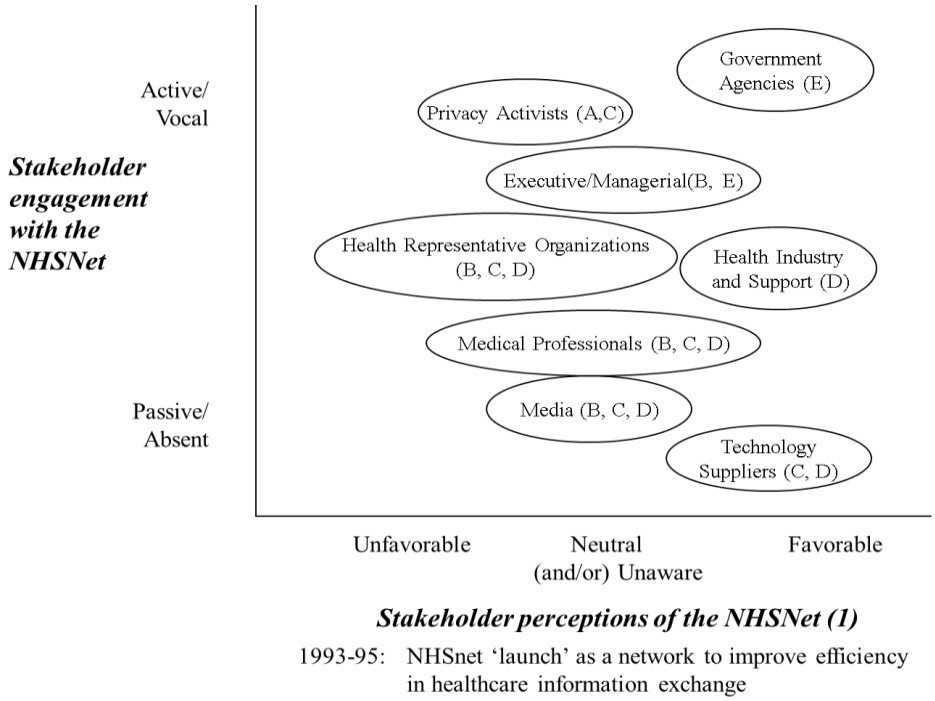

Figure 2 Perceptions of the NHSNet at the launch

Within the media, there was an absence of negative coverage about health IT, and the NHSNet more specifically. Medical personnel expressed some reservations about increasing health IT budgets, but the overall stakeholder response was generally positive in that technological progress would bring benefits to healthcare organizations and patients alike. Doctors occupying 'b' positions, which were negative tended to voice their opinions in a passive way rather than complaining formally to senior health managers or other groups (e.g. the media or medical professional associations). Some of the negative comments were about rising health budgets and the need to carefully prioritize expenditure, on either (among other things) patient care or technology investment.

However, as the project developed, members of the medical community gradually raised more questions about the network. They were concerned about the technology procurement progress, but more specifically about the use and sharing of medical data. The privacy of

patient data took prevalence in the debate, resulting in the very active engagement of the British Medical Association (BMA), the doctors' representative body in the debate, with security consultants, privacy activists and other doctors' representative bodies (e.g., GMSC, DIN) entering and dominating the scene as 'A' type stakeholders, actively resisting the NHSnet. Privacy and security remained perennial for a few years (especially in the years 1995-1998). Groups as diverse as NHS management bodies and the GCHQ formed alliances in support of the NHS Executive propositions, whereas various stakeholder groups gradually joined forces in the name of patient rights and doctors' interests to act against the NHSnet in general and the security mechanisms in place in particular.

However, as the NHSNet progressed throughout the 1990s, a change of government in 1997 saw the shift in political opinion where information technology became linked to ideologies of progress. The 'New Labour' government of 1997 heavily promoted technology as a means of improving the NHS. There was cross-party support for promoting health IT, and this was further enabled by technology suppliers who saw a real commercial opportunity to win large government contracts.

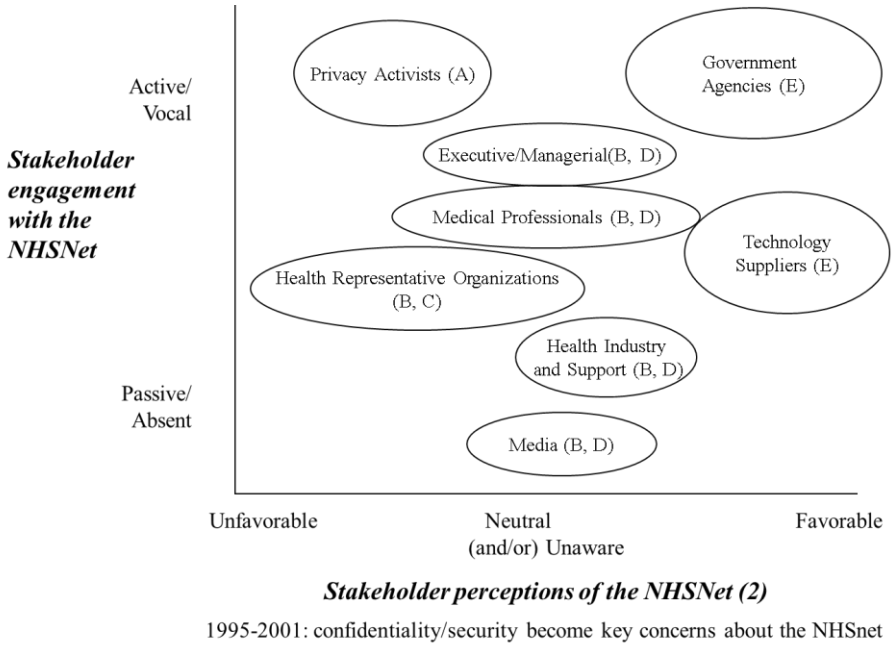

Figure 3 Changing perceptions of the NHSNet during Phase I

Yet, our interviews with hospital doctors and consultants revealed contradictory stakes, with many voicing criticisms about the centralized nature of government policy for health IT. During this period, the prospect of Internet based technology was not yet envisaged, so the conflicted stakes were more about, 'not being informed' about health IT policy, rather than fears about major changes to working practices. Medical professionals began to adopt more polarized positions (B and D) as they either held an unfavorable position but were not voicing it publicly (feeling they were more effectively represented by the BMA) or maintained a 'wait and see' attitude, passively accepting of the network. As a stakeholder group, hospital doctors, who do not have a central role as 'gatekeepers' of patient information tended to remain neutral or passive to a network that would provide them with faster access to patient data ('C' type stakeholders).

During the period between 1995 and 2001 (see Figure 3) most medical professionals were not actively voicing their approval or disapproval about government plans to develop a "21st century health IT strategy". For example, organizations such as the BMA rely on the advice and input from leading medical professionals, who both influence and are influenced by the positions adopted by the BMA. On the issue of privacy and security concerns, some hospital consultants were influenced by some of the negative aspects of health IT, particularly around perceived concerns of lack of control, not just at the policy-making stage but also at post-implementation, where patient data could become vulnerable. This dynamic resulted in a shift towards 'A' type stakeholders, with some beginning to mobilize their support among health representative organizations and in the media. Much of this concern was on security issues for the NHSnet, rather than about health funding and working practices.

During this time, the privacy/security debate continued to gain momentum and featured largely in the news reporting in practitioner journals (see Appendix 1) and in the national press. The debate only receded, without being resolved, once the Caldicott Committee engaged stakeholders from all sides to agree on a set of principles:

"The Caldicott Committee failed to lay down hard and fast rules for patient confidentiality but because it produced a list of "god intentions" it certainly made it harder for BMA and other concerned organizations like DIN to continue to breathe fire and brimstone about matters. In this the commission probably served its purpose well" [Chairman of the Doctor's Independent Network].

Conversely, hospital doctors were also influenced by type 'E' stakeholders and were actively recruited to become government 'advocates' for the network. Overall, this group maintained

a lower profile, in their role as advisors or reference points for the NHS Executive and the Information Management Group.

IT suppliers increasing adopted type ‘E’ positions as they saw growing potential in working with the NHS as providing a new revenue stream. Interviews with this stakeholder group revealed many frustrations in working with the NHS, not least because procurement processes tended to favor the large IT supplier firm, rather than the small provider. One supplier summed this up, thus, “Computer firms of medium capacity find it difficult to understand the labyrinth of NHS procurement. It is very difficult to win contracts unless you are a large computer firm. We therefore work with the leading companies as sub-contractors. We support these firms but our knowledge of how the NHS works is limited”. Interviews with large IT suppliers reinforced the comments of hospital consultants and doctors in that negotiations between these firms was done at the very senior levels of the NHS with little information trickling down to medical professionals and administrators.

Shifting Positions and Stakes - Phase II

Towards the end of 2001, a major new initiative was launched in the form of the NPfIT. The change of government in 1997 provided the impetus to revisit NHS health IT policy. During this phase, we note that health IT as both a policy and an implementation plan fuelled even more interest than in the first phase. Technological developments during this phase accelerated, with accompanying publicity about how new health technology would transform healthcare.

A key observation from Phase II was that some stakeholder groups were replaced (e.g., the Information Management Group (IMG) was dissolved in 1999 and superseded by the NHS Information Authority, and later by Connecting for Health). Stakeholder groups became more actively engaged in this phase, largely as a result of the increasing technological infrastructure to report health IT policy issues and practices (e.g. the Internet, mobile phones, flexible news media, etc). The NPfIT would become one of the largest non-military government IT Programs worldwide with estimated expenditure likely to exceed £12 bn (Currie, 2012) Stakeholder groups also become more fragmented, depicted by the contradictory positions and stakes emerging. This posed challenges to our research enquiry.

While it was important to capture the conflicted views of stakeholder groups about the NHS N3, in terms of their relative positive or negative statements and also the extent to which they were actively or passively engaged in the Program, our empirical challenge was how best to present our findings clearly and concisely. A further methodological challenge in

depicting the complexity of the empirical field was that our research enquiry spanned more than a decade. In reviewing our empirical data, we concluded that the importance of presenting a snapshot of differing stakeholders views over two phases was more fruitful as a theoretical and empirical exercise than digging deep to reveal a detailed picture of how and why a specific stakeholder group, e.g. hospital doctors, may hold positive or negative views about patient data privacy and security. This is not to underplay the importance of this type of research enquiry, but to recognize that the strength in our approach was to focus on the 'big picture' of health IT policy implementation using a broad stakeholder analysis over an extended period of time.

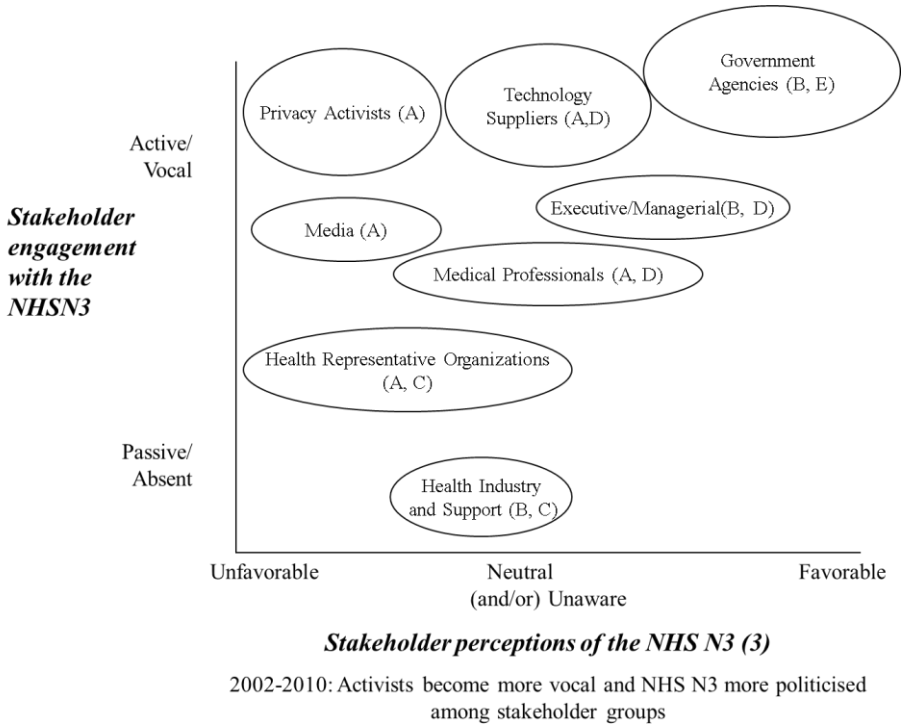

Figure 4 Changing perceptions of the NHS N3 during Phase II

So while Figure 3 illustrates the perceptions of key stakeholder groups covering the period from 1995-2001, Figure 4 provides an illustration of the changing perceptions of stakeholders to 2010. Here, we see that roles and perceptions of all stakeholders shifted significantly throughout the duration of the Program, with many adopting and occupying conflicted positions and views about the Program. What is important here is that, as the Program developed, there was a distinct move from relatively positive stakeholder perceptions about the NHS N3 to increasingly negative perceptions, as more stakeholders became disillusioned with the Program.

Representative bodies, such as the BMA (listed under health representative organizations) became actively engaged in questioning government policy on the NPfIT, largely because of data privacy and security concerns of transitioning patient records to online systems using the NHS N3 Network. These concerns were regularly voiced in the media, which tended to produce a snow-balling effect where clinicians, among other NHS employees, would also express their opinions about the shortcomings of putting patient records on a large database. Ironically, members of the BMA were also appointed as 'clinical leads' (type 'E' stakeholders representing government agencies) which was an advocacy which involved travelling the country to promote the benefits of the NPfIT. These roles were seen by some medical professionals as 'selling out' and clinical leads often found themselves harangued at public promotional events. Thus, in line with Principle 3, stakeholder positions were not necessarily unanimously shared by members of a stakeholder group.

In the figure we only mapped the dominant group position for clarity. GPs (medical professionals) we noted, increasingly became critical of the Program, and this was fuelled by growing concerns about how digital technology would be relied upon to protect sensitive patient data. The NHS N3 network as a means of providing the technological infrastructure to facilitate electronic health records was not politically neutral, although most criticism was pointed at the IT software (e.g. the EHR application) rather than the technological infrastructure. A common concern at this time from GPs was, "Our patient data is highly sensitive and GPs are increasingly concerned about who will have access to this data. Over a million people work in the NHS so the potential access could be very large, and this poses serious security issues". The stakes of GPs were being challenged here, since the 'ownership' of patient data was a vague area. Some GPs expressed the view that patient data is the preserve of the medical profession, while others believed it was that patients owned their medical record. Even others thought that such data belonged to the government, so views and opinions differed among the same stakeholder group. However, as the NPfIT was beset with so much bad publicity in the media, GPs visibly hardened their views and became more actively against the Program.

At the same time, health representative organizations, acting for patients, demonstrated some ambiguity about the Program. Many adopted type 'A' or 'C' positions. One patient group based in Brussels, noted that, "Most people don't know anything about electronic health records. Our job is to educate patients about their rights. We are very concerned about data privacy, but we think this is unknown territory to many people right now" (Interview with Head of a Patient Group, 2009).

One clinical lead said that ‘keeping patients in the dark’ was a deliberate strategy on the part of the agency running the NPfIT (Connecting for Health) since patients would become informed about the technical changes once the implementation program was well under way. This fuelled much debate among privacy and security stakeholders who argued that patients should be fully informed about how their data will be used and managed by the NHS. Privacy activists, during this phase, became increasingly active in their concern about patient data security. What was interesting was that such concerns were increasingly adopted by other stakeholders, notably, health representative organizations (the BMA) and independent associations, such as the BCS. Even industry and support organizations, such as pharmacists, increasingly adopted type ‘B’ positions, where they expressed concerns about the cost of adopting the NPfIT, although they did not actively engage in campaigns to abandon the Program.

One of the more significant shifts up to 2010, when our data collection ceased, was the actively open hostility towards the NPfIT by large sections of the media. National newspapers, health publications, IT (print and online) magazines, and other ‘eHealth’ or health IT offerings, all became engaged to report on the Program as, ‘a computer fiasco’, ‘and IT failure’ or a ‘waste of public money’ (see Appendices 1 and 2). The interaction between different stakeholders tended to create an incendiary situation, where medical professionals could voice their growing concerns about the Program with journalists who were keen to publish ‘a good story’ on ‘government waste of public funds’.

6. DISCUSSION AND CONCLUSION

From the initial launch of the NHSnet in the 1990s, to the end of Phase II of our research, the NHS N3 Program, under the NPfIT umbrella, was highly publicized and generated extensive media coverage, thus giving all stakeholders a platform to express their opinions. Despite various NAO reports (2006, 2008) calling for more ‘user engagement’, to win the hearts and minds of NHS staff, particularly clinicians, the increased publicity about the NHS N3 produced the opposite effect, since much of the media coverage highlighted policy implementation problems, e.g. two leading IT contractors pulling out of their NHS contracts, repeated missed deadlines, data privacy concerns, increased workloads for clinicians and administrators moving to electronic health records, potential system downtime and growing costs of the Program. Emerging from our data analysis was that stakeholder roles and perceptions were becoming increasingly entangled and polarized.

Our case on the NHS N3 network infrastructure over a fifteen year period deploys stakeholder theory, not as a managerial tool to identify successful policy decisions or otherwise on a large scale IT Program, but to broaden the research landscape to include multiple stakeholders with different levels of power and influence. Power relations are particularly relevant within stakeholder theory. Our study shows that power relations are embedded and entangled within policy directives where different stakeholder groups engage with health IT depending on their perceptions of whether such initiatives support or detract from their positions or stakes (Bourdieu, 1977).

Related concepts of legitimacy and urgency are attributes used in stakeholder identification and the relative influence of stakeholders (Mitchell et al, 1997). However, while the literature on stakeholders remains relatively under-theorized, where the term stakeholder is deployed largely as a static and mechanical concept, our research suggests that stakeholder groups are complex and dynamic, where their interests and values change over time. Even within the same stakeholder group, the notion of what is seen as a 'legitimate' reason for action or behavior is subject to the influences of other stakeholder groups. For example, medical professionals who initially adopt a favorable stance towards health IT policy may over time, actively withdraw their support, while others are drafted in as government advocacy representatives (e.g. clinical leads for Connecting for Health). Such conflicted views among the same stakeholder group need to be theorized and understood, so a driver for further research may be to help policy-makers understand how and why stakeholders shift their positions from supporting health IT policy initiatives to adopting less favorable positions.

Our interpretive stakeholder analysis reinforces prior work which shows that interests and values shape and are indeed inseparable from the stakeholders' understanding of the world (Introna and Pouloudi 1999; Introna 1997). These interests and values clearly influence a stakeholder's stance at a particular point in time but only partly explain their position. Power becomes a key attribute alongside stakeholder interests for determining the visibility of certain stakeholders and helps to identify possible 'allies' and 'enemies' to management strategies (Boonstra et al., 2008; Eden and Ackerman 1998; Freeman 1984). We embed power relations within the wider context of policy-making rather than confining it to a managerialist agenda within health service organizations. This, we believe, is more fruitful, since stakeholder groups comprising NHS executives are just as likely to an adopt anti-managerial agenda, where they disagree with top-down initiatives to restructure managerial and professional roles and responsibilities, which is more in line with the positions and stakes of other stakeholder groups, e.g. medical professionals. Thus, the power of

stakeholders does not only affect the participation and visibility of stakeholders, but how different stakeholder groups exert their influence, not only at the organizational level, but also at the political (government agency) level.

Our empirical data demonstrate the intricate ways in which stakeholders are interrelated, shaping and changing the way in which an information system is considered by each (i.e., thus influencing a stakeholder's position on the vertical and horizontal axis of Figures 1 to 4). Stakeholder interrelationships become visible in the ways in which stakeholders go about defending and strengthening their position. Consequently, the landscape for the adoption of an information system in an entangled context can be largely understood by following the stakeholders' efforts to create alliances and mobilize sympathetic stakeholders while reducing the credibility and participation of stakeholders with conflicting views.

Our findings show that stakeholders can create alliances with other groups, for example they can inform and consequently mobilize 'C' type stakeholders from their passive and neutral position. Stakeholders therefore attempt to shape or change the views of potential allies by presenting a viewpoint that matches the interests and values of the latter, but also one that is recognized as *legitimate*. Ironically, in the NHS N3 case, it is the interests of patients, the 'silent' and arguably less informed stakeholders, which give legitimacy to the views of others: as all stakeholders claim to act in the interest of the patients. Yet our data shows that patient interests, represented by patient groups, are under-represented at both phases of the NHS N3. This is ironic since patients as a stakeholder group, are clearly the most important in terms of what the NPfIT policy is trying to achieve, e.g. improve patient care.

Many of the stakeholders against the NHS N3 ('A' and 'B' type stakeholders), for example, were concerned that the patients lack information about the vision and purpose of the NPfIT, make wrong assumptions about the confidentiality of medical data and consequently do not understand the implications of what it means for their health data to be stored and transferred over a computer network infrastructure. This is where the public utterance of the risks that the NHS N3 creates for patients becomes the rhetoric that 'A' and 'B' type stakeholders use to recruit allies in their critique of the network. 'E' and 'D' type stakeholders act in a similar way, praising the benefits of the NHS N3 in the provision of patient care or introducing new stakeholders to defend this position. We observe that these actions and the resulting media debate about privacy and security have influenced the views and involvement of several stakeholders, leading to an increase in negative views about the entire NPfIT (see also, NAO, 2011).

An observation from our study is that delineating stakeholder groups by professional, managerial and technical categories or groups is only part of the picture. Our heuristic of stakeholder roles and perceptions found that several stakeholder groups, i.e., medical professionals, NHS executives, and health representative organizations, for example, were spread across all type A-E positions. Over time, some positions expanded, with more stakeholders becoming actively and passively opposed to the NPfIT (A and B), and others neutral (C), with other groups adopting more favorable positions (D, E). This suggests that stakeholder groups need to be more vigorously examined as individuals located in the same group often held different 'stakes' depending on how they perceived the Program would affect their interests. This finding has important implications for policy-makers since the public appointment of clinicians in advocacy roles, for example, was seemingly at odds with their professional roles as potential users of the technology. Such variation in the views of individuals occupying the same stakeholder group was not recognized in government sponsored reports which tended to lump the issue of resistance to the NPfIT as a 'lack of stakeholder engagement' which can be resolved by a managerial solution to appoint clinicians to better sell the Program to their NHS colleagues. This would be done through a communications exercise of 'benefits realization' to ensure that NHS staff would be fully cognizant of what aims and scope of the Program (NAO, 2006, 2008).

While our extended interviews with multiple stakeholders do not result in a tidy set of findings from a single case or stakeholder group, we argue that our stakeholder analysis of the roles and perceptions of the stakeholder groups provides a richer understanding of entangled contexts around the NHS N3. The methodological challenge for future research and practice in the information systems field is to study and gain an understanding of how health IT is depicted in success and failure stories, and to appreciate how diverse stakeholder views may influence the outcome of a Program one way or another. In this spirit, we propose some themes from our development of interpretive stakeholder analysis that we believe are transferable to other contexts. Based on the case study presented in this paper, we argue that the use of interpretive stakeholder analysis for understanding participation and perception can be a useful approach to understanding information systems contexts. We call for a broader understanding of stakeholders which embraces different units of analysis to include the political, organizational and departmental levels, where stakeholders as individuals, members of teams, representatives of professional bodies, and even government advisors, are likely to become conflicted in their interpretation and involvement in large scale health IT programs. While this research has not sought to explore conflicted views and perceptions among individual stakeholders, future research may consider how this may impact public sector IT programs, particularly as the legitimacy which is attributed to

senior medical professionals in providing advocacy and support to government initiatives in healthcare may also conflict with the legitimacy of others who also occupy senior roles. While our evidence gives examples of contradictory positions and stakes among medical professionals about the N3 network, more research is needed to explore such entanglement to further develop stakeholder theory as a set of concepts which go beyond identification and engagement.

The use of interpretive stakeholder analysis highlights issues such as personal and professional interests and values, roles and responsibilities, power and legitimacy. Whilst it is possible to attempt to operationalize and isolate the effects of particular factors, our heuristic of stakeholder roles and perceptions using the U–shaped curve suggests a deeper understanding can only be obtained by accepting that no simple or straightforward explanation can be found for such entangled contexts. Although it seems counterintuitive, the heuristic representation we presented is powerful not just for showing stakeholder movement over time, but also for challenging the researchers to appreciate that stakeholder groups cannot be neatly positioned or categorized. Positions and stakes change over time, and so it is not feasible to attribute favorable or unfavorable views of stakeholders using a static approach. Researchers can therefore use heuristic devices for stakeholder identification, and also apply additional stakeholder concepts and techniques such as stakeholder mapping and engagement for both a static and dynamic analysis.

While the stakeholder concept has been in use in information systems research for more than two decades, it is not without its dissenters. As a managerial approach, many would not dispute that stakeholder analyses can help “frame issues that are solvable in ways that are technically feasible and politically acceptable and that advance the common good” (Bryson, 2004:21). Stakeholder analysis is also used widely to evaluate the effectiveness of policy (Brugha and Varvasovsky, 2000). However, criticisms have been directed to Freeman’s (1984) seminal stakeholder theory in four areas: 1] inadequate explanation of the process; 2] incomplete linkage of internal and external variables; 3] insufficient attention to the system within which business operates and the levels of analysis within the system, and, 4] inadequate environmental assessment (Key, 1999: 321). We recognize that our research shares some of these limitations. However, our purpose here is not to track all the relevant time periods where, for example, the views of isolated stakeholder groups may have changed their position. Rather, it is to demonstrate through multiple stakeholder identification over a long time period, how large scale IT programs in complex organizations, such as health systems, are more appropriately understood as politically-driven processes rather than simply judged on technical criteria alone. So to dismiss the problems of the NPfIT as a

‘computer fiasco’ seems to miss the point. As we demonstrate, the technology slice of the N3 was only a bit part player in the much wider context of competing and conflicted stakeholder groups, as they focused on much wider health and IT related issues, including, health budgets, patient safety, data security and privacy and private sector contracting, among others.

While our study deploys stakeholder theory to analyze our data, we suggest that its usefulness is more as a guiding framework rather than to present our concepts as a rigidly defined set of theoretical tools (Bourdieu, 1977). To some extent, the strength of stakeholder analysis is also its weakness, in that it encourages researchers to look beyond the narrow focus of single stakeholder groups or communities (e.g., the ‘user’) by including multiple stakeholders with competing agendas. Such a broad focus introduces more challenges in the research process to identify stakeholders, and also to understand their complex social relationships. These limitations are unavoidably present in our study, since the NHS N3 network infrastructure is not a single technology implemented in one organization, but a nationwide government-led initiative involving multiple stakeholders within a healthcare setting.

Notwithstanding these theoretical and methodological limitations, we believe that stakeholder theory offers a fruitful approach to broaden the scope of IS research, extending beyond observing the effects of single stakeholder group interests. This study builds on prior research which shows that introducing large-scale new technology in the NHS is not simply a ‘managerial’ or ‘technical’ activity, but an enactment of government policy, which may be highly controversial and infused with political, managerial and technical agendas (Currie, 2012). Indeed a very recent ‘post-mortem’ of the dismantled NPfIT (British Parliament, 2013), observes ‘failures to understand the complexity of the tasks, to recognize the difficulties of persuading NHS trusts to take new systems that had been procured nationally, and to get people to operate the systems effectively even when they were adopted’. Such a statement underpins our concept of stakeholder entanglement as the multi-faceted nature of the NPfIT gradually unraveled, not because it was a ‘computer failure’ (as characterized in the media) but because conflicted stakeholder positions and stakes conspired to destabilize the original government health IT policy. Stakeholder entanglement played out at all levels. First, the lack of cross-party (political party) support for the NPfIT mean that media organizations could exploit the lack of political consensus and expose all the shortcomings of the Program, such as missed deadlines, failure to agree procurement contracts, clinical resistance, etc.

Second, mirroring the lack of political consensus, entanglement also emerged as stakeholder groups adopted conflicted positions and stakes. Clinicians expressed varying views about the viability of moving patient records online, and this was exacerbated by the rapid pace of technology, where health IT policy quickly became outdated. This type of entanglement was made more complex where clinicians occupied multiple roles, e.g. as medical professionals, as advocates for/or against the Program, as information privacy advisors, as representatives on patient committees, as media commentators, as board members for IT companies, etc. A clinician could therefore 'wear many hats' at the same time, and this could result in potential conflicts of interest. So a narrow focus on one stakeholder group, such as, the 'end-user', which is used frequently in IS research as the dominant stakeholder, is therefore less relevant in our research since the failure to introduce a fully working EHR within the NHS meant that this group has relatively minor influence compared with other stakeholders (i.e., politicians, hospital executives, media, IT suppliers, pressure groups, consultants, etc). Third, stakeholder entanglement occurred across organizations, particularly as external (non NHS) organizations increasingly came to play a larger part in realizing government health IT policy. Our interviews revealed some discontent from hospital managers and doctors about the increasingly role of management consultants, brought in by NHS executives to change health processes and technologies. This became a growing reason for reversing planned 'user engagement' strategies, as clinicians were able to mobilize their powerful representative organizations to feed stories to the media about why the 'NHS computer system' was a waste of public money.

In summary, this paper has argued for the application and development of an interpretive stakeholder analysis approach to the study of entangled information systems contexts. This approach, that we grounded theoretically on a set of stakeholder principles, defined within an interpretive epistemology and illustrated empirically through a case study, constitutes a significant contribution to earlier work on information systems stakeholders. The paper identifies stakeholder entanglement around the NHS N3 and raises broader stakeholder issues, including the values, interests, power, legitimacy and representation of different stakeholder groups. Our work has lessons for policy-makers, not least to show that introducing high profile, public sector health IT at such an ambitious level, does not guarantee a successful outcome, despite the large sums of money used not only for technological infrastructure and applications, but also for public relations and advocacy. At a theoretical level, we aim to broaden stakeholder theory through applying our concept of stakeholder entanglement to the complex NHS organization to interpret our empirical data on the NHS N3 Network. We encourage IS researchers to embrace the notion that stakeholder analysis extends beyond a narrow focus on single stakeholder roles and

perceptions. Rather, our study points to complex power relations within and across stakeholder groups, which are potentially unstable and therefore subject to change. The empirical challenges in further developing the concept of stakeholder entanglement poses several problems, not least that research enquiry needs to focus on relevant stakeholder groups, which may extend beyond the more traditional focus on managers or users. Health IT policy implementation, however, cannot be adequately studied in complex organizations like the NHS, without understanding the influence of key stakeholders, such as political agencies and professional bodies, among others. We therefore encourage IS researchers to develop and apply the concept of stakeholder entanglement in other information systems contexts, with healthcare providing one example of such a rich and diverse environment.

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Appendix 1. The role of secondary data collection sources: sample extracts and their relevance

Type of Data/ Data Source	Sample data extract(s) [Note: bolded text denotes our emphasis]	Relevance to the research
Government Reports/websites		Formal stakeholder role description(s) – relations with other stakeholders
Department of Health (www.dh.gov.uk)	"The Department of Health (DH) helps people to live better for longer. We lead, shape and fund health and care in England, making sure people have the support, care and treatment they need, with the compassion, respect and dignity they deserve. DH is a ministerial department, supported by 25 agencies and public bodies." (https://www.gov.uk/government/organisations/department-of-health)	The DoH leads all UK government actions related to healthcare provision. In addition to its formal role and structure, as presented at its website, the Department issues publications on matters of public health. The NHS Executive (see next) is part of the DoH.
NHS Executive (www.nationalhealthexecutive.com)	NHS-Wide Networking (NWN) Programme: "initiated in early 1993. This is a major programme of several inter-related projects whose overall aim is to improve the quality and responsiveness of local and national health care services by enabling all parts of the NHS to communicate with each other efficiently, securely and cost-effectively. It will provide a key part of the infrastructure to support the national IM&T Strategy". [Information Management Group Project Information Pack, September 1994 – IMG Reference B2127, NHS Executive]	
	"The **Information Management Group** (IMG) is part of the **NHS Executive**. Its aim is to improve the ability of the NHS to harness and exploit the potential of information and information technology. One of the key objectives of IMG is to support the NHS Executive in promoting the national Information Management and Technology (IM&T) Strategy for the NHS in England". (p. 4) "The National Health Service Executive (NHS Executive) is the top management tier of the NHS. It is part of the **Department of Health** and is responsible to Ministers. The Information Management Group is part of the NHS Executive. […] Ray Rogers is the **Executive Director** of IMG and is responsible for the day to day management across the whole group." (p.5)	Formal statement of purpose for the project leading to the NHSnet.
	"During 1993 the NHS Executive agreed the need for an NHS-Wide system of electronic communications and centrally managed arrangements to oversee its implementation. Although the **NHS-Wide Networking organization** does to formally comprise a branch of IMG, the staff report to the Executive Director of IMG and work closely with IMG Branches. Tony King took up the post of Head of Networking on 1 July 1994. Tony leads a **Communications Management Group** and eight **Local Communication Management groups** corresponding to the boundaries of the NHS Executive's regional offices. The local Communication Management groups co-ordinate networking services on behalf of users in their area to meet the strategic requirements under the guidance of their **Local User Representative Group** which have been established in all eight regions. The Central	Formal definition of role and structure of the Information Management Group (IMG), the initiator and key promoter of the NHSnet and its relation to other stakeholders (DoH, Central Communications Management Group, Local

	Communications Management Group is the central body co-ordinating the networking requirements of national applications […] It also ensures conformance to national communications and security standards and policies to enable inter-regional connectivity of services". (p. 17) [This is the IMG. October 1994. A guide to the Information Management Group of the NHS Executive, Ref. No: B 2126, NHS Executive]	Communication Management Groups, Local User Representative Groups)
Connecting for Health (www.connectingforhealth.nhs.uk)	"N3 is the National Network for the NHS. It provides a robust and reliable broadband network, supporting IT infrastructure, world-class networking services and sufficient, secure connectivity and capacity to meet current and future NHS IT needs. […] The N3 provides the essential technical infrastructure through which the benefits to patients and staff from the new systems and services will be fully realized and sustained in the future. N3 helps to speed up essential communications within the NHS" […] (www.connectingforhealth.hnhs.uk/systemsandservices/n3/factsheet) "N3 is one of the largest Virtual Private Networks in Europe with in excess of 51,000 connections (September 2012), 63 points of presence and employing over 12,000 km fibre. N3 provides the NHS Internet Gateway serving 1.3 million employees. N3 benefits more than 60 million citizens through the NHS. N3 underpins the NHS National Programme for IT, the world's largest civilian IT programme and enables all National Applications including: The electronic booking service, Choose and Book […], Electronic Transmission of Prescriptions (ETP) […], Picture Archiving and Communications Systems (PACS) […] and The NHS Care Records Service (NHS CRS)". (n3.nhs.uk/newton3/N3enabling21stCenturyhealthcarefortheNHS.cfm)	
n3.nhs.uk	"Launched in 2002, the National Programme for IT in the NHS (the National Programme) was designed to reform the way that the NHS in England uses information. The vision of the Department of Health (the Department) was to implement modern information technologies to improve the way the NHS delivers services, and ultimately enhance the quality of patient care. The National Programme comprised a number of component programmes including a broadband network, electronic appointment booking and prescription services, and local care records systems. […] (www.publications.parliament.uk/pa/cm201314/cmselect/cmpubacc/294/29402.htm)	Formal statement of purpose for N3. [note: NHS Connecting for Health ceased to exist on 31st March 2013]
UK Parliament (www.parliament.uk)	"While some parts of the National Programme were delivered successfully, other important elements encountered significant difficulties. In particular, there were delays in developing and deploying the detailed care records systems. Following three reports on the National Programme by both the National Audit Office and this Committee, and a review by the Major Projects Authority, the Government announced in September 2011 that it would dismantle the National Programme but keep the component parts in place with separate management and accountability structures. That process has now taken place. In June 2013, the Department published a statement on the benefits to date and in future from the	Presentation of current status and services of the N3.

	programmes that made up the National Programme" (www.publications.parliament.uk/pa/cm201314/cmselect/cmpubacc/294/29404.htm)	
		NHS policies (the IM&T strategy, subsequently the NPfIT) have often been debated in the UK Parliament – see also the following entries. The Parliament's web site provides access to bills & legislation, committees, publications and records. Reports of the **Public Accounts Committee** (which, for example, concern the NPfIT) are available through the Parliament's website.
Independent Reports		Formal reports on current state of affairs; evaluation reports and policy reports
National Audit Office (NAO)	"The scale of the challenge involved in delivering the National Programme for IT has proved to be far greater than envisaged at the start, with serious delays in delivering the new care records systems. Progress is being made, however, and financial savings and other benefits are beginning to emerge. The priority now is to finish developing and deploying care records systems that will help NHS Trusts to achieve the Programme's intended benefits of improved services and better patient care."	Tim Burr, head of the National Audit Office, 16 May 2008
British Computer Society	"The BCS Health Informatics Forum is a broad church of those working in and with the NHS in the field of informatics….The BCS shares the vision of the NPfIT. We believe the introduction of effective, usable and ubiquitous electronic patient records will be a significant advance in direct patient care.	British Computer Society, 2005) http://bcs.org/upload/pdf/auditofficejan05.pdf
	Foreword of the Caldicott Committee Report on the review of patient-identifiable information – December 1997: "This Review was commissioned by the Chief Medical Officer of England owing to increasing concern about the	

Caldicott Committee	ways in which patient information is used in the NHS in England and Wales and the need to ensure that confidentiality is not undermined. Such concern was largely due to the development of information technology in the service, and its capacity to disseminate information about patients rapidly and extensively. […] It is clearly important that confidentiality does not impede the provision of prompt and effective patient care. But at times there is a tension between the needs of the service for patient information and the expectation of patients that information about them will be kept confidential. It is not uncommon for the NHS to have to balance conflicting needs of this kind; this can be done by adhering to explicit and transparent principles of good practice which we have outlined […]"	Committee membership [= formal **stakeholder groups**]: representatives from: - the Department of Health - NHS Executive (including the IMG) - Hospitals and NHS Trusts (consultant, nurse, chief executive) - Health authorities - GPs - Royal College of Pathologists Key (absent) stakeholder acknowledged in the report: patients. **Stakes:** maintaining confidentiality (vs. effective information exchange and effective care); confidentiality debate resolution (implicit)
Newspaper articles		Reports on contemporary issues and debates
Financial Times, Other 'Broadsheet' daily newspapers, Local newspapers, NHS news.	BT's dominance of health service IT has been revealed by government figures showing the firm received more than two-fifths of NHS Connecting for Health's 2009-10 £1.1bn supplier budget.	The Guardian, 8 Spetember, 2010.
Hospital Reports		Hospital policy and data; hospital IT policy
Annual Reports (many are publicly available)	Reports are usually found under the heading 'IM&T strategy, NHS. A report was published by the Department of Health in 2003 called, 'Delivering 21st Century IT Support for the NHS. This report was the precursor to the NPfIT -	

	http://webarchive.nationalarchives.gov.uk/20130107105354/http:/www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4067112.pdf	
Practitioner journals		Articles for practitioners, incl. news
British Journal of Healthcare Computing & Information Management [BJHC&IM]	*The data confidentiality and security debate continues*. BJHC&IM (1996) 13:3, 6: "The British Medical Association (**BMA**) renewed its criticism of the NHS Information Management Group's (**IMG**) approach to patient confidentiality and data security during a heated debate at the HC 96 conference in Harrogate last month. Their **security advisor**, Ross Anderson, told a crowded conference session that the IMG's IM&T strategy "threatens to permanently destroy the privacy of the **doctor-patient relationship**", would lead to inefficient centralization of all information flows in the system, and discriminates "against vulnerable members of society […]" "We have to take a long hard look a the IM&T strategy and rewrite it so that it is centered on clinical concerns rather than administrative concerns; so that it is oriented towards **patients** rather than **administrators** and optimized for the delivery of healthcare rather than as a means of enforcing bureaucratic power and control from the centre" he said." *Red Pike swims into data security debate*. BJHC&IM (1996) 13:4,6 "John Horam, Parliamentary Secretary at the **Department of Health**, has announced that the **NHS Executive** is to carry out pilot study to explore the feasibility of introducing encryption services across the NHS-wide network (NHSnet). The decision follows the publication of a report about the implications of using encryption commissioned by the NHS and undertaken by the information security consultants, Zergo. **Zergo** concluded that the benefits of introducing encryption could be considerable […] It also recommends the us by the NHS of the *Red Pike* encryption algorithm, which […] would enable the NHS to implement a practical solution without becoming locked into a single **supplier** or system. *Red Pike* was devised by the Communications-Electronics Security Group (**CESG**), the information security arm of the **GCHQ** and the government's national technical authority on IT and security matters." *BMA says data security problems can be solved*. BJHC&IM (1996) 13:4, 6 "An unexpected glimmer of hope has emerged in the data confidentiality 'debate' between the British Medical Association (**BMA**) and the **Department of Health**. […] it seems that the publication of the recent **Zergo** report on data encryption could be viewed as a key […] While the BMA **security consultant** Ross Anderson criticised the Zergo report as being "highly unimpressive" and containing "a number of serious mistakes", he also said he "took comfort from the fact that the NHS was clearly prepared to spend sensible amounts of money […] to remedy the data security problems". […] Hover, he also said the architecture proposed in the Zergo report, using the *Red Pike* encryption algorithm, was "politically unacceptable, technically way out of data and won't command public confidence".	**Stakeholders identified:** BMA, IMG, BMA security advisor, patients, doctors, administrators **Stakes:** patient confidentiality, data security, doctor-patient relationship, centralization, discrimination, clinical vs. administrative concerns, delivery of healthcare vs. bureaucracy & control **Stakeholders identified:** Department of Health, NHS Executive, security consultants (Zergo), IT suppliers, CESG/GCHQ **Stakes:** encryption, security, supplier lock-in, government control (implicit)

	Benson, T. *Healthcare information systems security – a system developer's view*. BJHC&IM, (1998) 15:2, 40-44. "If the **BMA** and the **NHS Executive** do not agree, we do not have consensus. […] **Healthcare professionals** and **managers** are naturally risk averse […] Lack of consensus over heathcare information security implies that the risks involved are difficult to manage […] One way to avoid such risks is to choose not to acquire electronic systems, even though they might greatly improve the efficiency and effectiveness of the services provided. This would be bad news for **system developers**…" *Use of X.400 protocal as basis for NHSnet still under review*. BJHC&IM (1999) 16:8, 4 "Asked about the reliability of NHSnet, he [**DoH** spokesperson] said: "We are currently improving the technical aspects of NHSnet, which provides a secure messaging system for use strictly by the NHS. We are working with our **suppliers** on ironing out any technical problems – which follows extensive consultation with representatives form the **British Medical Association** over the past months"."	**Stakeholders identified:** Department of Health, BMA, BMA security advisor, security consultants (Zergo), public **Stakes:** confidentiality, security, encryption, security problems, report quality (reliability, political and technical quality)
Network News	*Budget for NHS projects vanishes in £300m debt. Deficit leaves health networks in crisis*. Network News, 26 March 1997, p. 1, report by I.Jones "All network projects at the NHS are in jeopardy after it emerged that two thirds of **health authorities** are in the read, with a overall national deficit of £300m. […] The NHS's largest and most pressing project is linking all health authorities to the NHSnet […] The **Labour Party** hit out at the **Government** over the issue, claiming that too much money is being wasted on bureaucracy. *NHSnet – is it DOA?* Network News, 2 December 1998, pp. 40-41, report by G. Matthews "… On the face of it, the NHSnet is to the public sector IT projects what Stanley Kubrick's forthcoming *Eyes Wide Shut* is to Hollywood – years late, way over budget, and everyone has forgotten what it was supposed to be about in the first place. To be fair, nobody ever thought it was going to be easy. The NHS is made up of more then 100 **health authorities**, 429 **hospital trusts** and 10,000-odd **GPs**, not to mention 56 million or so **customers**. Sewing this lot together under on IP-based communications infrastructure was always an ambitious idea. Two years on from the infrastructure supposedly being ready, and a full five years after blueprints were drawn up, few people are seeing any real benefits. Instead, many authorities that were advised to expect major savings are grappling with implementation costs they cannot afford. And **GPs**, without whose involvement the project is worthless, are signing up in dribs and drabs, put off mainly by connection costs said to be at least £5,000 per practice. […] The NHS' own Information Management Group (**IMG**) has this year unveiled a radical strategy to the NHSnet idea moving ahead once more. The strategy is multi-part and highly complex, but in essence it aims to promote the	**Stakeholders identified:** BMA, NHS Executive, healthcare professionals, managers, system developers **Stakes:** risk, security, efficiency and effectiveness **Stakeholders identified:** Department of Health, IT suppliers, BMA **Stakes:** technical problems, reliability, consultation with representatives

	benefits of electronic communication, showing it as a boon and a money- and time-saver. […] Mary Friel, business development manager for the public sector with **Cable & Wireless** – the joint provider, along with **BT**, of access services for the NHSnet – is both philosophical and optimistic […] "It is taking time to galvanise all these disparate interests, and for them to get funding. We will only really see all the promised benefits when everybody is connected, and that's going to take another couple of years at least". Puzzling to many outside observers is the variety of roles taken by what seems to be a multitude of cooks stirring the same broth. **BT**, responsible for the backbone of the project, shares responsibility for access services with **Cable & Wireless**, acting in competition so that buyers have a choice. Also involved until recently was **AT&T**, which was running – among other things – the **Prescription Pricing Authority** network until it sold out its interest in the health market to US-based healthcare IT specialist, **HBO**. **Racal**, likewise, has a historic interest in the project, and is still the name behind many of the existing X.25 links to the NHSnet from GP surgeries, predating the upgrade to an X.400-based infrastructure. […]"	**Stakeholders identified:** health authorities, Government/opposition **Stakes:** cost, bureaucracy
Computing	*Health scare.* Computing, 19 October 1995, pp. 28-29. Report by D. Willcox […] The NHS-Wide Network, set to go live next year, will ultimately link thousands of **GPs**, **hospitals** and **health authorities**. The system is designed to speed up NHS bureaucracy, bring faster and more effective patient care, and save millions of pounds. But the network, being prepared by **BT** and **Mercury** and expected to complete trials in November, lacks encryption to protect data and security is restricted to sever passwords and user-authentication. […] **Ray Rogers, executive director of the NHS Executive's Information Management Group (IMG),** which is responsible for the network initiative, only added fuel to the debate when he described the future of the infrastructure as an 'NHS Internet'[…] The **British Medical Association (BMA),** the organization for medical professionals, stepped up its campaign to get the **DoH** to introduce encryption to the network after meeting on 5 October with other groups which share its fears. Concerned parties include **nurses' unions** and the **Data Protection Registrar**. […] **Privacy International**, a watch-dog made up of academics and computer experts, this month called for GPs to boycott the network. […] 'Basic data has to include details identifying you, where you live and your medical conditions. This isn't a matter of confidentiality – we are talking human rights and privacy.' Horner [Chairman of the **BMA's medical ethics committee**] points out that the threat from **hackers** attempting to break into the NHS-Wide Network through its fir-walled link to the Internet, is secondary to the greater potential for abuse of confidential information by **NHS employees** themselves. […] if the **general public** becomes aware that information they give to their **GP** could be abused, then they might be less likely to seek medical advice and treatment. Dr Paul Steventon, vice chairman of the special interest group **Doctors Independent Network** (DIN), agrees that the real danger comes from within. […] 'To date, very little notice has been taken of the ethical requirements of NHS clinicians because the system has been designed and specified mainly to ease the task of NHS managers – who naturally do not wish to be	**Stakeholders identified:** health authorities, hospital trusts, GPs, 'customers' of healthcare, IMG, IT/network suppliers (BT, Cable & Wireless, AT&T, HBO, Racal), Prescription Pricing Authority. **Stakes:** project management (time, cost, scope), perceived cost, perceived benefits (or lack thereof), 'disparate interests', multiple suppliers, competition and customer choice

excluded by the health professionals from direct access to any data they may see fit to extract. This apparently includes confidential patient records, which clinicians are bound to protect from improper disclosure'. […]
Rogers believes the medical profession is panicking unnecessarily about confidentiality and says he was 'saddened' by the BMA's stance, which he described as 'blinkered'. […] Rogers admits it is up to individual hospitals to decide how they offer online access to patient data. […]
Murray Bywater, **analyst at NHS IT market research firm** Silicon Bridge, claims the fears of loss of confidentiality are largely exaggerated […] because the use of the NHS-Wide Network will remain limited for some time. […] Bywater believes the NHS should look at the systems within hospitals before trying to build the mother of all networks. [..]"

Struggling for a final cure. The NHS's internal fragmentation means a comprehensive IT system will be a long and painful process. Computing, 12 February 1998, p. 20. Report by S. Carew.
"The infrastructure has been in place for over two years, yet is use has been anything but uniform. […] The Department of Health (**DoH**) seems to have taken this on board, judging by its recent actions to promote the use of electronic communication throughout the whole health service. […]
[…] Frank Burns, the current head of the **IMG** is as aware as anybody of the unwieldy nature of the health systems monster. One dilemma he faces is how far to impose central IT standards. […]
John Aird, **information management and technology head** at United Bristol Hospitals **NHS Trust**, argues: 'There is so much reinventing of wheels all over the place. There's little financial alternative but to move towards a more central direction'. But centralization will bring nightmares of its own. Aird points out that the more organizations are judged by performance, the more they are pushed away from the centre as they seek to make their own decision on how to maximize their efficiency. [...]
Currently, only 310 out of 10,000 GPs are connected to NHSnet – compared with 295 of 429 hospital trusts and 96 out of 100 health authorities. […]
London's Hammersmith Hospital Trust, one of the biggest in the country, has just streamlined the computer systems of its four hospitals, a process that took one year to procure and six months to implement. […]
… [Howell Huws, Hammersmith's head of IT] also sees confidentiality and security as prime concerns. He added: 'The NHS hasn't agreed what is appropriate security yet'. […]

Stakeholders identified: GPs, hospitals, health authorities, IT suppliers (BT, Mercury), IMG, executive director of the IMG, BMA, BMA's medical ethics committee, DoH, nurses' unions, Data Protection Registrar, Privacy International, Doctors Independent Network, NHS employees, general public, analysts, NHS IT market research firm
Stakes: bureaucracy, speed, access, confidentiality, security, encryption, public perception, hospital readiness

GPs censure NHS IT plan. Computing, 25 March 1999, p.3. Report by M. Cross.
"The **BMA** is already advising doctors not to sign up to the NHS intranet NHSnet, a cornerstone of the [NHS IT] strategy. Dr Grant Kelly, chairman of the **information management committee**, describes the network as neither secure nor financially attractive. The **NHS Executive** has tried to calm doctors' security fears by appointing an expert on confidentiality and security as chairman of its new information authority. Professor Alastair Bellingham will head a new agency, the **NHS Information Authority**, which replaces the discredited **Information**

Management Group."

GPs show little faith in NHSnet. Computing, 21 February 2000, Public Sector Digest, p. 2. Report by S.Ranger "Only one third of **GPs** have signed up for NHSnet and only one half of those have used it in the last month […] As well as cost, another stumbling block is that **hospitals** are even less IT-literate than GPs. […] Another problem was that the network was based on the X400 legacy protocol, which requires users to handle a complex and unwieldy addressing system."

Stakeholders identified:
DoH, IMG, NHS Trusts, information management & technology/IT heads of NHS Trusts
Stakes: cost, standards, centralization (vs. local control), performance, internal IT projects/priorities of Trusts, confidentiality and security

	Stakeholders identified: BMA, BMA's information management committee, NHS Executive, doctors, NHS Information Authority [new stakeholder], IMG [exiting stakeholder] **Stakes:** security, cost, role of management
	Stakeholders identified: GPs, hospitals [BMA, medical IT provider also noted in the article] **Stakes:** cost, IT-literacy, technical issues
Mailing lists	GPs (primarily) and other stakeholder exchange views on matters of interest; of interest are discussions on the

		NHS network, confidentiality and security, the role of GPs and patients as well as use of IT in healthcare more broadly.
gp-uk mailing list	Subject: Security of NHS network "It has been suggested that I copy this to the mailing list: Press Statement – British Medical Association 11 December 1995 BMA WARNS DOCTORS ABOUT GOVERNMENT GUIDANCE ON COMPUTER SECURITY The **BMA** today warned doctors that new guidance by the **Department of Health** on computer security had been issued without the agreement of the BMA. […] Dr Fleur Fisher, **Head of Ethics, Science and Information at the BMA**, commented: "**Doctors** need to be aware tat this guidance does not have the full support of the BMA and clearly has been issued as a pre-emptive move in the coming negotiations between ourselves and the NHS Executive officials. […] The guidance will, we understand, be sent to GPs shortly and we would urge any doctor receiving such a document to contact the BMA first before being beguiled by the Department's talk of the advantages of such a Network. We believe that, once the Department has addressed properly the questions of compartmentalising the system and including encoding or encryption for sensitive information, we can welcome such a Network as a major step forward for communication throughout the NHS. […] It remains the BMA's policy that it is not acceptable to connect any computer containing identifiable clinical information to the NHS Network or to any other network outside clinical control." *Post by Ross Anderson, Security Consultant to the BMA, 14 Dec 1995* Subject: re: Security of NHS network "Congratulations to the **BMA** team who have worked so hard on this. […] If **doctors** simply won't contribute confidential patient data to the NWN, the **NHS management** will certainly recognize it to be in their bet interests to alter the system until we are happy to use it. […] If we don't win this one the profession will have opened an era" *Post by vice-Chairman of the Doctor's Independent Network, 14 Dec 1995* Subject: re: Security of NHS network "It is my opinion that all around the globe (and the UK) **doctors** are responsible for what they write, how they write and what will be done by others with what they have written. It is of the outmost importance that **patients** trust their doctors. And that what the doctors write down is strictly confidential. […] By all means **doctors around the globe** should stick to this ethically justified stance. And should seek international support.	These sample extracts show variety of stakeholders that are engaged in the debate about the NWN (NHS-Wide Networking) and the NHSnet, the variety of stakeholders they each name in their posts (bolded), the interests they explicitly state for their stakeholder group and the interests they attribute to others. It is also interesting to note the writing style, occasionally characterized by humor, irony, or passionate statements. **Stakeholders identified:** BMA, BMA security consultant, Department of Health, doctors/medical profession/GPs/doctors around the globe, NHS management/senior officials/NHS Executive, the computer industry, Doctor's Independent Network, patients/public/people/'Joe Public', government, DTI, GCHQ, FBI, NSA, Zergo **Stakes and issues**:

Post by a doctor based in the Netherlands, 14 Dec 1995 Subject: re: Security of NHS network "The hot topic on everyone's lips is "privacy". And, as usual, **the computer industry** is in the process of confusing and disrupting the issue beyond recognition… We have factions all over the place each arguing passionately for its own most beloved encryption scheme, and some of the rhetoric is getting pretty heated […] *by a GP, NE England, 14 Dec 1995* Subject: re: Security/BMA: NWN – the storm clouds are gathering "**Ross** [Anderson] (and **the BMA**) argue a strong and persuasive case. I have the following points to make: 1. Please do not bring ethics into it before knowing the views of those whose confidentiality is going to be potentially compromised. But that's democracy for you, The BMA shall speaketh for all! (come back Ivan Illich, all is forgiven). 2. There are millions of bits of data about almost everybody in the land. I know, [another mailing list participant] landed in hot water over this. But, health data is no exception under current arrangements (work out the examples yourselves). 3. It is after all a question of consent. The act of consenting to something completely and utterly destroys almost all of the argument. 4. So, I say, let the people speak and let us abandon our insistence that we are the only custodian of confidentiality and the only repository of wisdom. […] 6. this is my "alternative" policy: I will ask my **patients**. If they don't mind, I'll implement, if they do, I won't. Simple. And not a committee in sight! […] *Post by a GP, SE England, 14 Jan 1996* Subject: re: Security/BMA: NWN – the storm clouds are gathering [in response to the post above] "Consent should be INFORMED. It's OK to tell the Doc on the assumption (often wrong but never clearly stated) that it goes no further. If **Joe Public** fully understood the implications of where his medical records could end up, do you think he'd tell us? Another fallacy is that you only need confidentiality if you've got something to hide… rather like saying you wouldn't object to all your mail being opened. Confidentiality should be assumed as an integral part of the design of any decent medical system […] *Post by a GP Computer Adviser & GP Trainer, NE England, 15 Jan 1996* Subject: re: Security/BMA: NWN – the storm clouds are gathering "I am a **patient** and one who is aware of the UK's professional standards relating to confidentiality. Please do not	confidentiality, security, encryption, (fair) stakeholder representation (for doctors and for patients), consent, trust (patient/doctor relationship), nature of doctor's work, network efficiency, cost of connecting, government control agenda, centralization.

be so arrogant as to believe that ONLY **the [medical] profession** can take decisions in this area. There is, in my view, a difference between privacy and confidentiality. I decide what information I impart about myself (privacy) and may *or may not* decide to place a duty of confidentiality upon the recipient of that information (confidentiality). In the absence of an understanding of these matters then the default may be to let the clinician decide and protect, but when you can (and if you will), please discuss it with me. That is, after all what will happen if the **BMA**'s policy/principles are enacted anyway.
Are patients so ignorant or incapable of grasping these concepts that we should leave it all to the doctors to decide regardless? I, for one, think not.
Post by a patient, 23 Jan 1996

Subject: re: Spooks and encryption
"…The **government** would like to read **people's** medical notes, and they are building a number of systems (Such as the Clearing service) that will let them do just that. Why on earth mess about with intercepting communications? It's expensive and unreliable. Far better to just centralize the processing of all relevant records on the excuse that this will make payments more efficient and facilitate audit, research and management generally […]
On the encryption side, the agenda is driven by **GCHQ** whose priority is to placate the **American intelligence community**. The **FBI** and **NSA** are now engaged in their third attempt to grab control of civilian crypto (for details on all this, see http://www.epic.org).
The current initiative was conceived by the NSA […] It was introduced in the UK via the **Zergo** report – which I now understand was preceded by a briefing at GCHQ for equipment suppliers, to which the **BMA** was not invited. After the Zergo report received a muted response, the **DTI** [Department of Trade and Industry] went ahead with their announcement of a plan to regulate trusted third parties.
Very senior officials in the NHS have denied that their policy is being driven by the intelligence community, and have even expressed distaste at my mentioning GCHQ in their presence. However, these are the same officials who assured us categorically on the 2nd May that doctor's keys would to be escrowed, and then completely changed their tune after the DTI announcement. So anyone who believes that the **NHS Executive** is in charge of their crypto policy needs his head read (as they say in Glasgow). So does anyone who thinks that these manoevres will help build the necessary **patient** and professional confidence in NHS networking. […]
Post by Ross Anderson, Security Consultant to the BMA, 25 Jul 1996

Subject: re: NHSnet/Internet gateway
"What is it for??? A very good question. NHS.net is the big idea of having a secure, private wide area network, or more specifically, intranet (a WAN using internet technologies) for all folk who work for the NHS or with the NHS or are at all connected in any way with the NHS and can conform to the Code of Connection and can fund the equipment and can fund the maintenance and the training and the time to read the details and then assess its

	value, and see a benefit and NOT be out of pocket at the end of the day, and yet somehow deliver better patient care over the desk at 9am on a Monday morning. Because we have better access to information. Hmmmmm… It could work but it is horribly, horribly, complicated so far. "Why" is because it *could* bring substantial benefits, if it works, and if we use it. With secure networking (and I mean SECURE (you have to keep shouting it)) we could be able to grab patient records of the net of our new patients, say or arrange out patient appointments in a surgery that day, there and then, or find out the latest protocol for treating athletes foot, or hear about OCP scares at the same time as the press. […] So that is why. Of more relevance, I feel, is do GPs want it? Certainly seems difficult to convince my colleagues of the potential benefits. Also the ongoing security saga is spoiling the party, somewhat. […] The scariest thing, I find, is that this is a "huge" project, that could (will?) substantially change how we work, and yet so many folk seem to know so little about it. […] *Post by Health Center doctor, Scotland, 2 Oct 1996.*	
Websites of patient representation groups		Provide information for various organizations involved in patient representation and support
www.patients-association.com/	"The Patients Association's motto is **'Listening to Patients, Speaking up for Change'**. This motto is the basis on which we build all our campaigns. Via our Helpline, we capture stories about Healthcare from over thousands of patients, family members and carers every year. We use this knowledge to campaign for real improvements to health and social care services across the UK. In addition, our Helpline provides valuable signposting and information for patients and supports them as they navigate the Healthcare service."	Patients are typically treated as the silent stakeholder in all public debate about the NHSnet/N3. The websites of different patient association/representation/participation groups present their formal roles and provide evidence of activities and services offered to interested patients, their families and carers.
www.napp.org.uk/	"Patient Participation Groups (PPGs) work in partnership with their practices to: • Help patients to take more responsibility for their health • Contribute to the continuous improvement of services and quality of care • Foster improved communication between the practice and its patient • Provide practical support for the practice and help to implement change Established in 1978, NAPP is uniquely placed as the only UK umbrella organization for patient-led groups in general practice. We provide essential support to GPs and practice teams through a comprehensive range of evidence-based high quality specialist resources developed from over thirty years experience and formation of hundreds of Patient Participation Groups. We also provide essential	

	support to Clinical Commissioning Groups (CCGs)."
www.npsa.nhs.uk/	"Patient Safety was a division of the National Patient Safety Agency (NPSA). The NPSA was an arm's length body of the Department of Health. It was established in 2001 with a mandate to identify patient safety issues and find appropriate solutions and abolished in 2012". […] "On **Friday 1 June 2012** the key functions and expertise for patient safety developed by the National Patient Safety Agency (NPSA) transferred to the NHS Commissioning Board Special Health Authority."
www.npsf.org/	"The National Patient Safety Foundation's vision is to create a world where patients and those who care for them are free from harm. A central voice for patient safety since 1997, NPSF partners with patients and families, the health care community, and key stakeholders to advance patient safety and health care workforce safety and disseminate strategies to prevent harm. NPSF is an independent, not-for-profit 501(c)(3) organization."

Acronyms:

BCS	British Computer Society
BMA	British Medical Association
CCTA	Government centre for information systems
CSM	Committee on Safety of Medicines
DIN	Doctors' Independent Network
DH/ DoH	Department of Health
DTI	Department of Trade and Industry
FHSA	Family Health Service Authority (predecessor of health agencies)
GMSC	General Medical Services Committee
GP	General Practitioner
GPEP	General Practice Electronic PACT

HISS	Hospital Information Support Systems
IMG	Information Management Group (of the NHS Executive)
LMC	Local Medical Committee
LPC	Local Pharmaceutical Committee
LURG	Local User Representative Group
MCA	Medicines Control Agency
NHS	National Health Service
NWN	NHS-Wide Networking
OPCS	Office of Population Censuses & Surveys (currently Office of National Statistics)
PPA	Prescription Pricing Authority
PACS	Picture Archiving and Communications System
PSNC	Pharmaceutical Services Negotiating Committee

Appendix 2. Roles and stakes of NHSNet and N3* stakeholders

NHSNet and N3 Stakeholders (Names of the following bodies and organizations have changed over the course of the research)	**Role(s)**	**Stake(s) in N3** ([**E**]xplicit/Expressed (voiced), [**A**]ttributed, [**I**]ndirect)	**Selected examples from data and sources**
Medical Professionals i. primary care –general practitioners (GPs)	Provision of primary care; 'gatekeepers' between primary and secondary care; IT users; some are members of professional and activist groups; some subscribe to the gp-uk mailing list	Efficiency in data exchanges among healthcare professionals [E]; Patient data confidentiality [E, A]; Compliance with national requirements for IT use (resistance [E], concern about cost implications [A]); Adopt IS that meet needs of practice and expertise of doctors [I] Ownership of patient data, they are unwilling to share [A]	"GPs, without whose involvement the project is worthless, are signing up in dribs and drabs, put off mainly by connection costs said to be at least £5,000 per practice." (Network News, 2 December 1998). Computerization varied across GP practices in the 1990s, as did the expertise of staff. "…part of the reason for the debate with the medical profession it could be argued is that they like to hold on to their information they don't like others having access to it; it might raise certain questions as to the way that they work; that's a rather negative view but it's possibly one of the reasons, although on the face of it the reasons are very noble (they are acting in the interests of) the patients but there is also a narrower interest in keeping the information hidden" (PSNC interview, 1996)
ii. hospital doctors (Consultants)	Provision of secondary care; Senior and junior consultants	Efficiency in data exchanges among healthcare professionals [E]; But also: Lack of awareness [E] Level of involvement [E,A] Time pressures [I]	Levels of hospital computerization varied across hospitals in the 1990s, as did the change agents (senior doctors vs. junior doctors vs. administrators/IT staff) Overworked doctors in a hospital would disclose their passwords to nurses with lower access rights to patient data, so that the latter could do some of the data entry for the doctors. The hospital eventually responded with more severe clauses on security in the clinicians' contracts. (Interview with hospital pharmacist, 1996)
iii. Nursing staff	Support care provision – in hospitals, general practices and in the community	Support in documentation of health records [I]; Stakes aligned with clinicians [I]	"We work with new technology but we don't feel we know much about the IT strategy. Nurses are very busy so we tend to share passwords, which is not a good idea, but we do this because at handover times, nurses want to continue treating patients without time delays" (Senior Nurse, London-based hospital, 2007).
Primary Care Trusts (PCTs)	Primary care trusts (PCT)	Obtaining value for money for the NHS	"The PCTs are responsible for commissioning. There is a big

NHSNet and N3 Stakeholders (Names of the following bodies and organizations have changed over the course of the research)	**Role(s)**	**Stake(s) in N3** ([**E**]xplicit/Expressed (voiced), [**A**]ttributed, [**I**]ndirect)	**Selected examples from data and sources**
	were part of the NHS in England from 2001 to 2013. PCTs were largely administrative bodies, responsible for commissioning primary, community and secondary health services from providers.	(E) Collectively PCTs were responsible for spending around 80 per cent of the total NHS budget	debate which continues in the NHS about private/public sector contracts. My background is from industry and I don't really see a major problem with contracting out to the private sector. However, one of the problems about health IT is who has access to the data, particularly patient data. Some people, including many doctors and nurses are worried that patient records will be obtained and even sold by commercial firms, without the patient's consent or even their knowledge" (Head of PCT, London Based, 2008).
Hospital Trusts	Specialized care provision Relevant roles within hospital trusts: Medical professionals (see above) Managers/Admin staff Hospital Pharmacists Nurses (see above) IT management staff	Access to information [A]	"NHS managers – who naturally do not wish to be excluded by the health professionals from direct access to any data they may see fit to extract" (VC, Doctors Independent Network, cited in Computing, 19 October 1995, pp. 28-19)
Strategic Health Authorities (SHAs)	SHAs have responsibility for enacting the directives and implementing fiscal policy as dictated by the Department of Health at a regional level.	National health policy implementation (E) Using IT to increase patient safety (E) Resource allocation (A, I)	I think the role of the SHA is to get the PCT to take resources from healthcare organizations that are succeeding, and give it to those that are failing. One thing I have learned from working in healthcare, it that it is a battle of turf wars and resource allocation. The NPfIT is the same. The battle is who can win in a system that is constantly restructuring. (NHS Executive, Midlands Hospital Trust, 2009."
NHS Executive	Implement Department of Health Policies	Improve IT support [E, A] Cost-efficiency [E, A]	The IM&T strategy & the NWN project The rationale is 'let's see how cheaply we can get away with' and then if it doesn't work we'll continue to pay more until it does work rather than paying more, possibly up front and make sure that the system is compatible and right. (LPC interview)

NHSNet and N3 Stakeholders (Names of the following bodies and organizations have changed over the course of the research)	**Role(s)**	**Stake(s) in N3** ([**E**]xplicit/Expressed (voiced), [**A**]ttributed, [**I**]ndirect)	**Selected examples from data and sources**
Information Management Group (of the NHS Executive)	Develop and Advise on IM&T Strategy and Implementation in Healthcare	Promotion of the IM&T strategy of the NHS [E]	We meet every month to discuss IM&T issues. The Chair of the Hospital Trust attends the meetings. We act as an advisory group and try to link the business side with the IT (Interview at Hospital in West of England, 2004).
National/regional and local medical (LMC) and pharmaceutical (LPC) committees	Represent and negotiate on behalf of doctors and pharmacists LPCs: also liaise with the health authorities locally and with other national bodies who represent the interests of pharmacy	Mistrust between government and pharmacy representatives [I] Lack of awareness (due to lack of information) [E]	I don't think they are particularly well geared up to handling the technology. Certainly not at local level. Certainly, I'm sure central links are quite good -I think- but there doesn't seem to be much exchange of data from local to central or central to local, which is sad, because there is a lot of data and it would be extremely useful. Now, you need to dig very hard to find it. (LPC interview, 1996) There is too much of an 'us and them' situation; they keep hold of their information very very tightly; they think it could be misused by us, but they don't seem to realise that they could actually pay us to do some of the work to utilise the data that they've got then they would save so much more money. (LPC interview, 1996) "…it may be difficult to get the government to spend the money, again, to enable the long term project to be undertaken, there are generally small projects that are undertaken and the thing is they don't tell anybody about them, that's the real problem. You'd really have to wheedle the information out of the people to find out exactly what's going on in your area". (LPC interview,1996)
National/local user representative groups	Focus on 'users' of ICT in healthcare organizations	Variable awareness among user groups about the strategic and operational plans to use ICT (E)	"The notion of 'users' is an interesting idea. The range of skills and knowledge about ICT variables tremendously at national and local levels in healthcare" (Interview with IT Professional with responsibility for sitting on a National ICT Representative Committee, 2006).

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British Medical Association (BMA)	Trade union and professional body representing doctors locally and nationally	Representation of doctors' interests [E, A] Resist NHSnet [E] Utilize NHS skills and capabilities (E) Restrict use of private sector in NHS (E) Ideological re-positioning (A, I).	'We provide peace of mind in the workplace with our expert employment support; We are the voice for doctors and medical students throughout the UK; We promote the medical and allied sciences and the aims of quality healthcare' [….] 'We are for doctors, because we are doctors. Our insight and understanding helps us defend your interests when it matters most and fight hard to champion the profession.' (bma.org.uk) "Dr Grant Kelly, chairman of the information management committee, describes the network as neither secure nor financially attractive." (Computing, 25 March, 1999, p.3). One of the leaders of the BMA described the NHS IT programme as "the worst case of planning blight across the NHS" and called for it to be ended. The BMA launched a campaign to "save" the NHS from "commercialisation", suggesting it should remain "publicly funded, publicly provided, and publicly accountable." Dr Fielden said the Private Finance Initiative and Independent Sector Treatment Centre (ISTC) deals should be scrapped. Private management consultants should be "ditched" and that the health service would do much better to rely on the experience and expertise of its 1.2m staff. The NHS has 40,000 hospital consultants, 1.3 million employees, 250 'top leaders.'
The Pharmaceutical Services Negotiating Committee (PSNC)	Negotiation with the DoH, support for LPCs, advice, checking the pricing of prescriptions, liaising with other pharmaceutical bodies	Voicing implications of IMG projects (incl. NHSnet) for pharmacy [E] Expectation/ interest in involvement [E] Reactive stance [E] Issues of representation [E]	"If there are going to be links between pharmacies and the PPA it has to be through the NHS Network […] Many of these [NHS IMG projects] will affect pharmacy and it's the job of the pharmaceutical bodies to say 'What about the pharmacy? Have you thought about the pharmacy?'" "The key thing about pharmacy is that pharmacy must have access to those parts of the medical record which are vital for giving some advice on the usage of drugs" "You do try to move from being reactive to being proactive but

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			that's difficult because... the initiative is coming from the centre, from NHS Management Executive […] we usually find out about developments at the Information Management and Technology forum, each year and we either react at the meeting or if it is important we would write to them to emphasize the point". "The PSNC, RPSGB [Royal Pharmaceutical Society of Great Britain], NPA [National Pharmaceutical Association] […] overlap in many areas; we have a dialogue, at least one person in this office will be speaking to one person in either of the two bodies on a daily basis.. [These bodies] have a multidimensional overlap, which isn't particularly helpful because it means that the pharmacy isn't acting as one or doesn't appear to be one body, unlike the British Medical Association". (all interview extracts: PSNC, 1996)
Patient Associations and Patient Groups	Advocacy and representative roles	Access to care within a trusted environment	"If the general public becomes aware that information they give to their GP could be abused, then they might be less likely to seek medical advice and treatment" (Computing, 19 October 1995, pp. 28-29)
Pharmacists	Pharmacists are linked to the NHS N3 Network, primarily as part of the wider national program for IT (NPfIT) to facilitate the development and application of theelectronic prescription service (EPS)	Integral part of NPfIT (A) Concern about funding for EPS (E) Potential issues about integration with hospital/GP systems (I)	"Pharmacists are very open to developments in IT and that's been proved as I said earlier the developments in pharmacies have taken place with their own money and by themselves and they there's a lot of compatibility between pharmacists, now one would need to make it compatible between the GPs and between pharmacists, between the pharmacists and the PPA. I think that would be very useful." (LPC interview, 1996) Pharmacist (becomes a key) player because he's got a friendly image being in the high-street, being available. For someone who goes out to buy a pair of shoes or baked beans or whatever it is so easy to go into the local pharmacy and say look you dispensed this last week, is it possible that it is causing that problem? And the pharmacist will look at the

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			information. They haven't got much time but perhaps a little time to say it in a language that you will understand. You don't have to make an appointment. You know you can meet in an informal environment. (And the pharmacists may look at it and sat you are right). it happens all the time. I do some freelance work in a pharmacy and it's amazing. People come in and ask questions. (LPC interview, 1996) "As we run our own small businesses, pharmacists are concerned about the cost of introducing electronic prescription services for patients. We have to buy our own IT and the cost of printing electronic prescriptions is high. We think the government should provide more funding for this" (Pharmacist, London-based, 2006).
Pharmaceutical companies	Research and develop (ethical) drugs	Division of labor between GPs and pharmaceutical companies (A, I)	"Until recently I think the drugs industry looked at GPs, paid particular attention to GPs because they were the main tool obviously for achieving their profits - hospital to a certain degree, although the vast majority of prescribing takes place in primary care, so it was always a good idea for the pharmaceutical industry to go to the source of prescriptions. It's become more difficult to see GPs whereas at the same time they are noticing it's becoming more easy for pharmacists to see GPs. Now they seem to be told to see pharmacists." (LPC interview, 1996)
Department of Health/Connecting for Health	Lead government agency to oversee strategic implementation of NPfIT (including NHS N3).	Implement government policy on the NPfIT, N3. Promote the use of electronic communication in the NHS [E, A]	Connecting for Health aims to, "put in place through the use of new technology, information systems that give patients more choice and health professionals more efficient access to information and thereby ensure delivery of better patient care" (CfH, 2004, Business Plan, 3).
British Parliament/ Members of Parliament		Short-term political view about expenses [A]	"…it's all about year-in year-out budget and what you can do within the life time of one Parliament or one government and there does not seem to be a lot of interest in let's say well, let's have a 10-year policy, os if you do this now, what the results would be in 10 years time. They are not interested because they may not be in power in

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			10 years item. It's how much money hey can save of this year's budget; how much of that can be fed through from the Treasury to the government to pay for tax cuts. It's all political; it's all linked with political initiatives, which is wrong." (LPC interview, 1996)
Privacy Activists	Advocacy groups which emphasis the issues and threats associated with citizen/patient data infringement.	Desire to protect citizens'/patients' privacy and security (E) Calls for 'explicit consent' about patients' rights to have their medical record uploaded on NHS N3 database (E) Labelled as 'anti-technology' by those who promote NPfIT (A)	"Privacy and security about electronic patient data is an important issue. The planned IT changed in the NHS may threaten patient interests, particularly where the government wants to follow an 'implied consent path – which means that, if the patient does not object to having their medical record uploaded on the 'spine' (e.g. national database), it will be done automatically. We don't think this is right and so we call for a policy of 'explicit consent' – where all citizens must either agree or disagree as to whether their record is available electronically". (Interview in 2008 with Independent Privacy Activist).
British Computer Society The BCS is now, the Chartered Institute for IT	A membership organization set up in 1957 as a leading body for people working in information technology (IT).	To promote the study and practice of computing and to advance knowledge of, and education in, IT for the benefit of the public. BCS is also a registered charity (E)	"The N3 network and aspects of the Spine provide essential infrastructure which are working and are probably capable of meeting future requirements" (BCS, 2006). The NHS Connecting for Health should continue with N3, as it delivers and will deliver significant benefits" (BCS, 2006). The BCS calls for key parts of the £11.4 billion NHS National Programme for IT to be retained where, in spite of its failures, the technology foundation is good, particularly the roll-out of the NHS data spine and N3 broadband network (BCS, 2011). "While we recognise that for example, the delivery of applications into acute hospitals has proved problematic and painful, there have also been a number of successes.... The key now is to concentrate on the future - the National Programme must now position itself as a platform on which to build innovation" (Ewan Davis, Treasurer at the BCS Health, 2011).
Health ICT Professionals	Employed by NHS to develop ICT for health service delivery.	To develop a career in the burgeoning health IT field within the NHS, funded by the increased expenditure on the NPfIT	"Ten years ago, I would not have considered a career in health IT. But with the funding for IT and the career progression, it is better than banking, which has suffered after the financial crisis of 2008"

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		and other IT&M activities (A) Building IT capabilities in healthcare (E)	(IT professional working in a London-based hospital, 2009). "It has been a learning curve for me, working with doctors and nurses. I would not say they are anti-technology, but they are reluctant to learn new IT systems – probably because many of the doctors have not grown up with technology. Many of the hospital consultants are in their 50s so are not used to working with electronic records. But I think the training could be better" (IT professional, working in the West of England, 2006).
Contracted ICT Suppliers	Contracted-in by NHS and IT vendors to develop ICT for health service delivery.	To continue working under contract to deliver the NPfIT (E)	"Although I only came for 6 months, I have now been working here for 3 years. The contract IT staff become quite knowledgeable about the hospital systems, but I am not sure it is good to have too many contractors. I now feel part of the furniture" (Contract IT professional, working in the West of England, 2006).
Health Industry Researchers			Medix found 56% of GPs in England were at least fairly enthusiastic about the health service's National Programme for IT (NPfIT), but during polling in the last week of January that fell to 21%. Among hospital doctors, support fell from 75% to 51%. The Medix poll, co-sponsored by the Guardian and Computer Weekly, found doctors were anxious about the confidentiality of the proposed NPfIT system for transferring electronic patient records. This will allow authorised medical staff throughout the NHS to access a patient's medical history. The poll found 70% of GPs and 42% of non-GPs think records will be less secure than current systems. Only 2% of GPs believed the new system would be more secure. (Medix, 2004, Guardian, 8 February, 2005).
Health Industry Publications	Targeted reporting on health IT issues.	To report on the progress and lack of progress of the NPfIT and N3 network (E) Newsworthy stories (E) Exposing political and contractual 'conflicts of interests' (A)	"N3 is essential to the modern NHS. As the largest Virtual Private Network in Europe it is a project of a scale and complexity that has never been attempted before. N3 is delivered by the N3 Service Provider (N3SP), which is managed by BT. The N3 network links over 21,000 connections in England, 3,100 connections in Scotland and 10,000 non-NHS connections enabling key NHS applications" (e-Health Insider, 2008). "The Department of Health is set to extend its N3 contract with BT for another two years; but is

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			starting to consult on what will replace it". (e-Health Insider, 20 December, 2010)
National/Local Newspapers	Independent reporting of the progress of the NPfIT. To call to account all those 'stakeholders' responsible for the policy, design and implementation of the NPfIT	To report on the progress and lack of progress of the NPfIT and N3 network (E) Newsworthy stories (E) Exposing political and contractual 'conflicts of interests' (A)	"BT's work as part of the NHS National Programme for IT (NPfIT) continues to gain momentum. In London, where it is rolling out new IT systems to Hospitals, clinics and GP surgeries, BT has now delivered significant capability to 75 per cent of Trusts…BT has also delivered a further three software releases on the Spine, the central database and messaging service it is building and managing for the NHS. This has further built on BT's record of reliability, delivering major enhancement releases to the Spine. "" (Computer Weekly, 13 November, 2007). "I have been writing about the NHS IT strategy for over ten years. The story has always been interesting to our readers, but in recent years, it has become something of a scandal, especially after the two National Audit Office Reports (Editor of National IT Paper, Interview, September 2009).

*The NHSNet label was changed to the NHS N3 following the introduction of the National Program for IT in 2001. We therefore use both labels in our study.